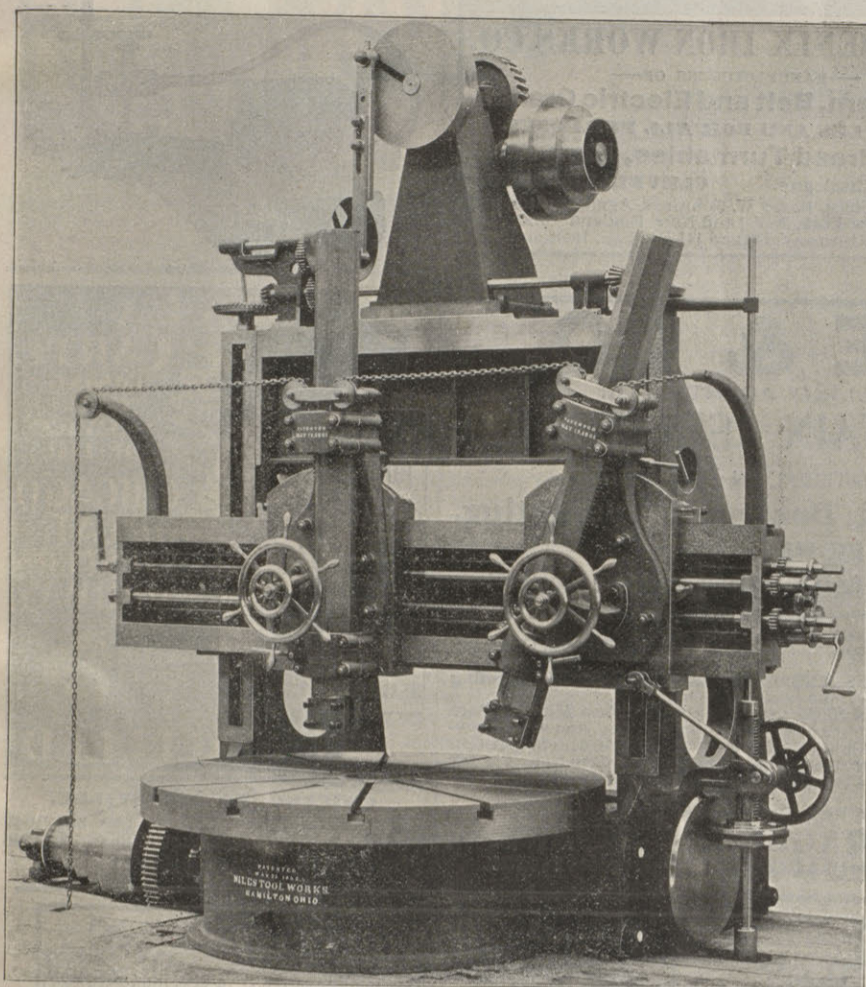


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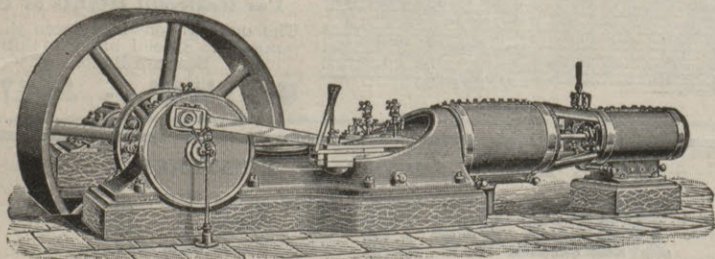
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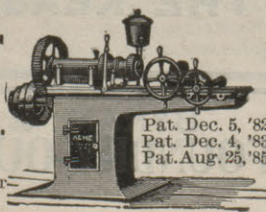
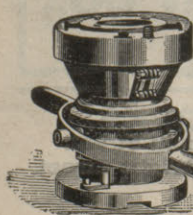
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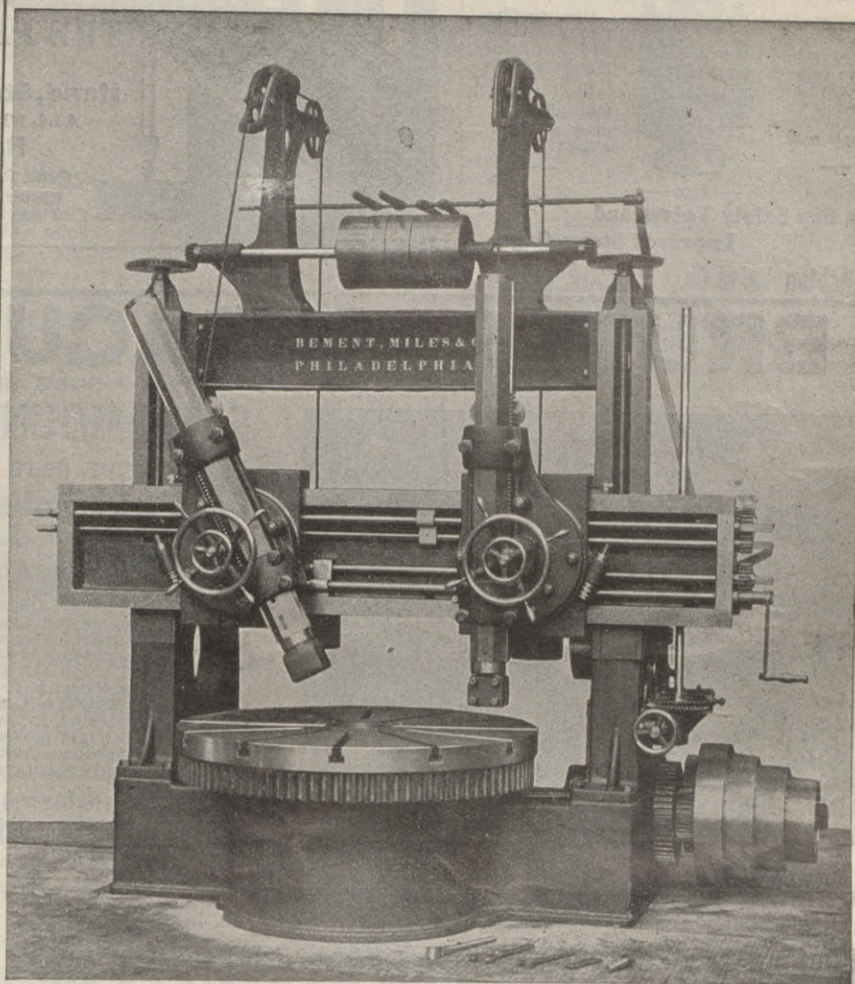
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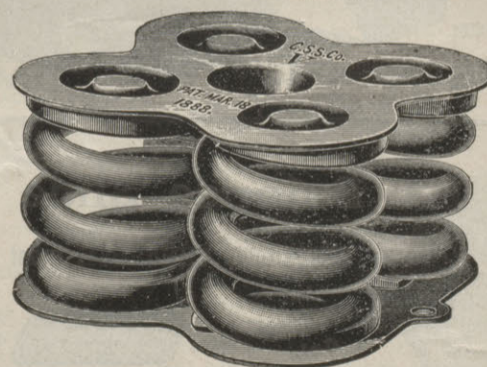
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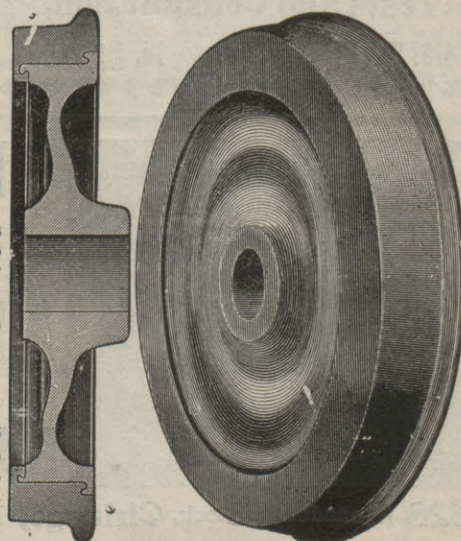
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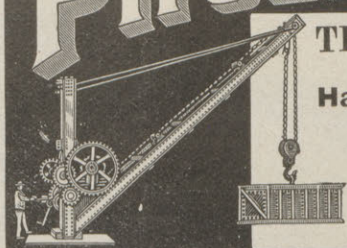


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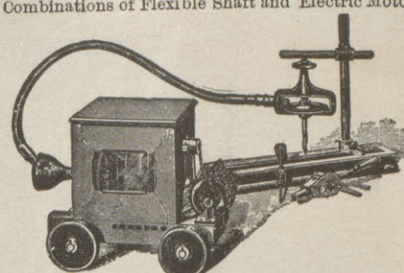


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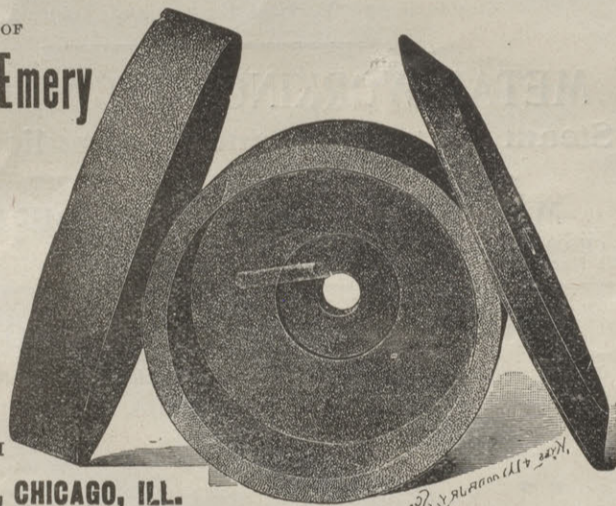
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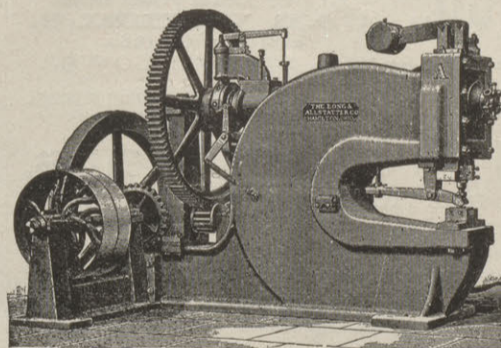
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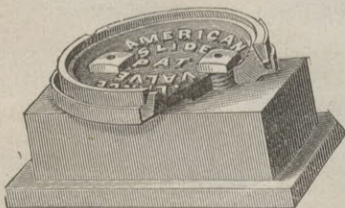


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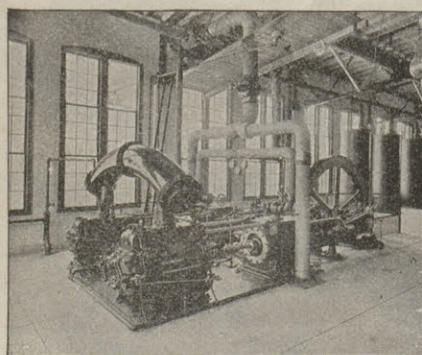
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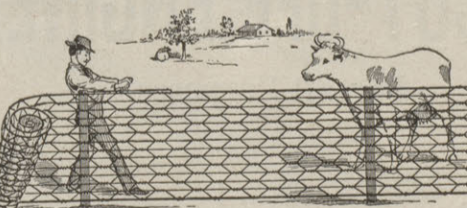
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THE RAILWAY REVIEW

No. 34

AUGUST 22, 1896.

XXXV.

FOUND IN OLD SHIPS.—The utilization of waste is well exemplified in the breaking up of ships of various kinds, for every nail and every chip are put aside for sale; but in the case of vessels of considerable tonnage, and especially of old craft, finds both curious and valuable are by no means rare. To give a recent instance, an old wooden vessel that was broken up near Greenwich, only a few months back, revealed a very curious sight when some old planking in the fore-castle had been torn down. Here, nailed up, were the two mummified hands of a negro, and in the palm of each hand, and transfixed by the same nails that held the hands were two counterfeit silver dollars, the hands were hacked off roughly. A year or two ago the breaking up of an old schooner near Sheerness brought to light beneath the inner skin of the hull quite an elaborate armament of a very old-fashioned kind, and a friend of the writer secured from among the many weapons included a splendidly made bell-mouthed flint-lock musket, the stock being marked with a representation of arm and leg fetters, and the name "Philip Steyne, Boston, Linconshire." The most curious part of this find was a set of books—a privateer's books evidently—showing the capture of various French vessels. Tied up in a canvas bag 190 guineas of gold were found a year or two back during the breaking up of an old vessel lying between Birkenhead and New Brighton. With the money were found, too, a most curious and unique set of foreign playing cards, some loaded dice, and three magnificent pieces of amber. All these were found in the false bottom of a wooden bunk.—[Marine Review.]

ALMOST AN ACCIDENT.—There is a tendency among trainmen to charge trackmen with habitual carelessness in putting the track in a dangerous condition without sending out signals, says Locomotive Engineering. The charge is not entirely without foundation; but trackmen, on the other hand, have sometimes reason to complain about the recklessness of trainmen in running past signals sent back to prevent accidents. A trackman, talking on this subject, said: "I have seen a good many close calls arising from the carelessness of section foremen and of engineers; but one that happened at the foot of Morgan's grade, eight or ten years ago, was the closest escape from disaster I have ever seen. At the foot of the grade there is a deep gully, spanned by a bridge about 150 feet high. One day we were working on the track at that point and a flag had been sent back to stop any 'extra' that might come along. Just as we had removed a rail, an 'extra' with a Sunday-school excursion came dashing down the grade, and we did not see them until they were around the curve, about 500 feet distance. They were so close that most of the men in the gang ran in terror from the spot where the opening in the track was; but two of the men, Jim Cary and Pat Sullivan, kept their heads, grasped the rail between them, and carried it quickly to the opening and threw it in. They had scarcely got cleared when the engine truck struck the rail. It held and the train passed over in safety. The engineer had failed to see our signal, and his carelessness very nearly resulted in running a train, loaded with four or five hundred children, into a pit of destruction."

IRON RUST.—A piece of rusty iron does not on the face of it appear to be a very promising material to engage the attention of the scientific student, and yet there are few common place objects as full of interest and so well deserving of attention. Why does iron rust? We used to be told that the rusting of iron is due to the simple combination of the iron with the oxygen of the water, the hydrogen formerly combined with the oxygen in water being set free. But we know now that this explanation is insufficient, and that there are many other factors which affect the process. Iron will not rust in pure water; neither will it do so in dry air, though the air contains free oxygen. It is known that carbonic acid is a necessary adjunct in the process of rusting, though there may be no trace of carbon in the resulting oxide. The chemical changes leading to formation of rust in the presence of carbonic acid and water appear to be in the first place the formation of a ferrous carbonate, which is dissolved in carbonic acid water to form ferrous bi-carbonate. This in turn decomposes in the presence of air into magnetic oxide, and this again in turn—in connection with the water—forms a hydrated ferric oxide, which is common rust. But in addition to these complex chemical changes which result in oxidation, there are electrical elements also affecting the process which, though at present little understood, are known to have a direct influence in retarding or assisting oxidation. Where two metals are connected together, and one is electro-positive to the other, oxidation will be retarded in the one and hastened in the other. It is not a little singular that although magnetic oxide is formed in the chemical process resulting in rust, the coating of iron with a layer of magnetic oxide entirely protects it from rusting.

THE CAMERA AS A SURVEYING INSTRUMENT.—In a paper recently read before the American Society of Civil Engineers Mr. Jno. S. Dennis of Ottawa gave an account of the use of the camera for surveying purposes by the surveys department of the Canadian government. The method in question was introduced in 1888 with a view to reducing the cost of the ordinary methods of survey, which became ex-

cessive in the Rocky Mountain district. In that year 250 square miles were surveyed by means of photography, and this amount steadily increased until in 1891 and 1892 double this quantity was dealt with, the cost of the survey being but 31s. per square mile. The method depends on the fact that a camera with a suitable lens gives a true perspective view, and conversely from perspective views it is possible to pass by a geometrical construction to the plan and elevation. Only a small party, consisting of the topographer, his assistant and a packer and laborer, are required in the field, and the amount of ground covered is very great. Thus the 500 square miles surveyed in 1892 only required sixty-one working days in the field, an important matter, since the heavy snows in the Rockies greatly reduce the time during which it is possible to work. On the return of the party home the packer and laborer were dismissed, and the topographer and his assistant proceeded to plot their maps from their surveys, the contours in this case being put in at 100 ft. intervals, the ground being very precipitous. The scale used was 1-20,000 (3.17 in. per mile); finally by the government it was reduced one-half.

TESTING QUICKSAND.—Suppose we take a certain quantity of quicksand, dry it artificially, and then try to make it into quicksand again. Put it into a box and pour water on it carefully. Instantly the water is soaked up, and if we measure the volume, or better, the weight of the sand, we shall see that it takes up a quantity of water that measures 30 per cent of its own volume, or 20 per cent by weight. The rest stays above the layer of sand. If we now pierce a little hole in the bottom of the box, we shall see pure water run out; the sand forms a kind of immovable filter. Also by turning the box upside down we see the sand keep its form like a stopper. It follows from this experiment that we cannot obtain quicksand in this way. We must reverse the condition of the experiment. Let us put the water into a vessel and sift in the dry sand in a thin stream, while shaking the vessel lightly. Then we shall get the thick but easily flowing compound known as quicksand. That the mixture may keep its mobility two conditions are necessary: 1. The quantity of water contained must not be less than 21 per cent by weight. 2. The whole must be continually though lightly shaken. If we increase the proportion or interrupt the agitation for an instant, the mass settles down retaining about 20 per cent of water, while the surplus, if it exists, rises to the top.—[La Nature, Paris.]

BRIDGE PINS.—In a paper recently communicated to the American Society of Civil Engineers, Mr. A. C. Cunningham gives particulars of a number of experiments which go to show that in many cases an unreliable material has been adopted for the pins of American bridges. It seems that it was not uncommon for the metal of the pins to be selected on the results of a test of a specially rolled $\frac{3}{4}$ in. bar. Such a size was, of course, thoroughly worked in the rolls, but when the diameter of the metal passing through the rolls was raised to 6 in. for the actual pin, this was not the case. In the first place, in order to save the rolls as much as possible, the metal was worked at the highest practical heat, and the blooms were, moreover, usually small, so that no great reduction was needed in reducing it to the 6 in. size. Larger pins than this were commonly forged, but in many cases the hammers have been too light for the blow to thoroughly penetrate the metal; in both cases test bars cut from the surface of the pin gave results much superior to those taken from near its center. No doubt, since the heaviest stresses on such pins arise from bending, the greatest strain comes on the strongest metal, which may account for the rarity of failures; but when it is quite possible to get a satisfactory quality throughout the whole of the pin, there is little excuse for putting up with the inferior and unreliable article. With a view to securing satisfactory results in the future, Mr. Cunningham recommends that such pins should be made of open hearth steel only, and contain not more than .03 per cent of sulphur, nor more than .06 phosphorus, if made by the acid process, the latter figure to be reduced one-half for basic material. The manganese he limits to not less than .5 per cent, nor more than .8 per cent. To secure proper working of the metal, the final bloom or ingot should be at least 50 per cent greater in diameter than the pin. The tensile strength at the surface of the pins should lie between 60,000 lb. and 70,000 lb. per square inch, and show an elongation of 20 per cent on 8 in. with a 40 per cent reduction of area, whilst at the center the strength must not be 5,000 lb. less than the above figures, nor the reduction of area 5 per cent less. Finally, pins should be annealed at a dark red heat before use.

HOW MUCH SILVER CAN WE COIN.—The superintendent of the Philadelphia mint has made an important statement to the effect that if a free silver coinage law should be enacted at this time it could not be enforced. He points out that it would be a physical impossibility for the government to coin the silver which under the provisions of such a law would be dumped into the mints. The government vaults now contain 200,000,000 ounces of silver bullion, and at the present minting capacity it would require five or more years to coin this into money before an ounce of the bullion which would be poured in under a free silver law could be touched. The superintendent claims that ten years would be required to increase the capacity of the mint, during which time bullion would be accumulating in such quantities that the mints would never be able to use it up. The answer of the average silverite may be anticipated. He wants the government to provide storage for vast accumulations of bullion, and then issue silver certificates to the coinage value of the bullion, at a ratio

of 16 to 1. Really he does not want silver at all. In fact he would rather not have it. He wants paper.

WHAT A "SOLELESS" RAILROAD CORPORATION DID.—A story that comes from New Castle, Pa., says that Mrs. Richard McCready, of Mahoningtown, has been made a very happy woman by a kind action of the Pennsylvania Company and that, too, after she had lost a case that she brought against the company in the Youngstown courts. In August, 1893, her husband, who was employed by the company as a laborer, was killed by cars running over him. The engine had been detached from the train, which consisted of a caboose and two or three cars. Contrary to the orders and against the advice of the conductor Mr. McCready went out on an unprotected car and endeavored to throw a coupling pin into the tank of the engine. He lost his balance and pitched forward and fell under the car, the front trucks passing over him. Some time after his death, Mrs. McCready gave the case to some Youngstown attorneys on shares. It was dismissed at the cost of Mrs. McCready. After all litigation was concluded the company inquired into the condition of the plaintiff and found that she was in sore financial straits. Upon this the company's officers voluntarily paid the bills and lifted a mortgage that was on her property amounting to \$408.73, and after all the indebtedness was settled they handed her an envelope which contained \$100.

EFFECT OF FREE SILVER.—George D. Boulton, the manager of the foreign exchange department of the First National Bank of Chicago, says in a letter: One of the most urgent motives of the silver party is that they want cheap money. By that I suppose they mean money they can borrow cheaply or earn cheaply. Now, the cheapest money in the world is in the strongest gold country, viz., England. The dearest money in the world is in the silver countries. For example, money in London to-day is 2 per cent per annum, while money in Mexico, China, Spain, India, and in fact all silver countries of the world, commands a loaning value of from 12 per cent upward. In the other gold countries of Europe, while money is not so low as in England, the rate varies from 3 to 5 per cent to the borrower. I may cite as a good example of the two currencies two states adjoining one another in South America—one British Guiana, a gold country, with money at 4 to 6 per cent per annum; the other Venezuela, with like soil and climatic conditions, a silver country, where interest rules at 10 to 12 per cent per annum. The course of events will be, if we make the change in accordance with the platform of the silver people, that in November, as soon as the silver president is elected, there can be no doubt at all but Europe will return our securities in large amounts. For these we have to pay gold or its equivalent. This will entail a large export of the gold we now hold or of commodities. Gold will advance to a substantial premium. No legislation can probably be made by congress until well along in the summer of 1897, during which period our circulation will be very largely depleted by export and hoarding. The return of our securities has got to be at very much below the present valuation ruling on our stock exchange—probably 15 or 25 per cent. If we can avoid a serious panic during such a crisis we may regard ourselves as fortunate. Under the most favorable circumstances we must look for great disturbances in value to all classes, a disorganization of labor and a hardening of money and general financial trouble, which will be felt by all classes, whether the farmer, the laborer, the mechanic or capitalist. Capital can always take care of itself and will feel the trouble the least, as it can largely unload its burdens on others.

PROPER SELECTION OF STEEL.—If steel manufacturers could in every case come into personal contact with their customers, and could always know the exact conditions under which a given bar of steel is to be used, there is no doubt, a writer observes, that this would result in a saving of many hundreds of pounds by steel users and in a much more satisfactory condition of affairs generally. An instance of this occurred the other day when a man entered the warehouse of a steel concern and proposed to buy a bar of steel from stock. In conversation with him it was brought out that he intended to use this steel for swaging dies—that is, dies for an operation similar to that which is performed in the Goodyear and Dayton swaging machines. He was informed that this bar of steel which he proposed to buy would probably make dies that would run in the machine an average of about eight hours each, whereas a bar of steel might be furnished him of the same quality and at the same price, but with its carbon adapted to the particular service required, which bar would make dies that would run an average of from eight to ten days on such work; and, of course, the proper steel was ordered. It cannot be too often impressed upon steel users that when they buy bars of steel in the open market they are buying steel which is usually adapted to the average or usual purpose for which bars of that shape and size are used, and that if tools are made of such a bar that are to be used for an entirely different purpose, then the chances are overwhelmingly against such tools being satisfactory; and in every case where it is possible, steel should be obtained for the specific purpose for which it is to be used; and if tool makers and machinists generally understood this and acted upon it there would, the writer adds, be far less trouble with steel.—Iron and Coal Trades Review.

USES OF STEEL CASTINGS IN MACHINERY CONSTRUCTION.—We always knew, says J. H. Allen in Dixie, that steel castings effected the lightening of machines. In the old

days of twenty years ago they did it when made from the same patterns as the cast iron, because they were so full of blow-holes that their weight fell off by a good 30 per cent; but now they do it because of the excellence of the quality of the materials used, and the resulting lightness of the patterns. When we can get steel castings having a tensile strength of 70,000 lbs. per square inch and an elongation of 25 per cent it looks very much as though hammered steel and iron would have to look to their laurels. Indeed steel castings are even now being advocated and pushed for locomotive frames, and when the other fellow has demonstrated the practicability of the scheme, and master mechanics have come to accept it with the always present idea that it originated with themselves, they will find that it will mean a saving of from \$400 to \$600 on each new engine.

TOPEKA HOSPITAL, A. T. & S. F. HOSPITAL ASSOCIATION.

Through the courtesy of Mr. J. J. Frey, general manager and Geo. W. Hogeboom, chief surgeon of the Atchison, Topeka & Santa Fe Railway, a photograph of the handsome and thoroughly equipped new hospital at Topeka, Kan., has been received. This is the finest building of which we have record as devoted to the railway hospital service, and the interior arrangement and the equipment is fully in keeping with the exterior appearance. The building is located upon the side of a hill, overlooking the tracks of the road, and yet sufficiently removed therefrom to escape the annoyance of the patients by noise or smoke. This is the fifth hospital now operated on the Atchison lines, the other four being located at Ft. Madison, Iowa; Ottawa, Kansas; La Junta, Col., and Las Vegas, New Mexico.

The building was erected by the A. T. & S. F. Hospital Association and was completed and turned

It is universally approved by the profession, especially for its compact and very elegantly situated, constructed and equipped operating room.

In reference to the utility of the Railway Employees' Association, the chief surgeon says that this association was organized in 1884 and since that time to date, the evidence has been complete and conclusive of the good effects and results of the association, both to the employees and to the railroad company; and he earnestly urges all railway companies to favor such organizations.

THE GREAT SEA WAVES IN JAPAN.

On June 17 a brief telegram in our papers told us that in Northern Japan great sea waves had broken on the coast, and that a thousand people had lost their lives. Two days later Reuter's Agency informed us that the number of those who had been drowned by the tidal wave was estimated at 10,000, whilst 70 miles of the north east coast had been inundated. On June 26 Europe was startled by the news that the number of victims exceeded 27,000, whilst 8,000 persons had been injured.

Notwithstanding the magnitude of this calamity, involving a loss of lives nearly six times as great as that Japan sustained in her recent war with China, the wires which connect us with the scene of the disaster remained silent until about July 11, when the Times published an official dispatch from Tokio, and we learned that the date of the disaster, instead of being June 17, was, in reality, two days earlier.

Now, since the arrival of mails from Japan, we are in a position to contrast this extremely meagre and tardily despatched information with that which

English papers to have forwarded us more definite information at an earlier date; the result of which is that the members of the Japan Society and others who desire to alleviate distress, have been delayed in doing so, until we may well suppose that many of the weak have died, and the devastated area may be again bright with flowers.

What we learned in Europe, independently of telegrams and mails about this disaster is, in its way, a seismometrical success deserving record. For the best part of a month the public in Europe were led to the belief that the date of the Japan disaster was June 17. On that day, however, microseismographs and equivalent instruments had been at rest, and therefore, if the telegrams were correct, a terrible oceanic disturbance, which must have been perceptible in all parts of the Pacific Ocean, had been created without any accompanying movement in the earth's crust. One June 15, that is, two days earlier, at about 8:30 p. m., Prof. Vincentini in Italy noted the commencement of the disturbance, in which there were several maxima which culminated in Japan time at about 9 a. m., on the following morning. A similar commencement was recorded at Shide in the Isle of Wight, but as at a later hour this instrument was dismantled for adjustments to correspond with those of a second instrument now working at Carisbrooke Castle, the complete record was not obtained. These facts so impressed those who were acquainted with the working of such apparatus and its capability of recording disturbances, even if their origin were at their antipodes, that notes were published in Nature and the Times suggesting that, for, unknown reasons, it was likely that our telegraphic information was incorrect. This surmise that Reuter and our newspapers were in error, and that the seismographs were not only right to the minute and the hour, but gave us information as to the number, relative intensity, and the times of occurrence of the successive efforts which created so much destruction, is now an established fact. The possibilities which observations of this nature suggest, respecting the determination of the rigidity of our planet from the rate at which it transmits motions, and even for limited distances of our being able to transmit actual messages, are filled with promises of success.

With these preliminary remarks, we will turn to the waves themselves, their probable cause, and the character of the district where they worked destruction. If we turn over the pages of the many Jishin Nendaiki, or earthquake calendars, published in Japan, we find that the country has suffered more from great sea waves than from any other cause.

The numbers who have perished on these occasions have varied between 1,000 and 100,000, the average number being from 10,000 to 30,000. The descriptions of these disasters are possibly often couched in extravagant language, and it is natural for those who live in more stable countries to imagine that such narratives suffer from exaggeration. From the official statistics which we have relating to the last disasters, and from what we know of the extreme exactitude of a nation that measures the distances between its towns to inches, the probability is that the estimates given for these disasters are fairly accurate.

One and all of these have taken place upon the eastern coast, where the land slopes rapidly downwards beneath the deep Pacific, and where there are soundings of over 4,600 fathoms. The magnitudes of the waves have depended upon the distance of their origin from the shore on which they impinged, on the sizes of the displacements by which they were produced, and on the contour of the coast which was invaded.

The sea waves of 1868 and 1877, originating as they did at a distance approaching 9,000 miles off the South American coast, took nearly 24 hours before they reached the coast of Japan, where they rose and fell every 10 or 30 minutes like rapidly recurring tides. The inhabitants on the coast, naturally alarmed at such a phenomenon, and not knowing the height the waters might eventually attain, fled with their penates to higher ground. Although in many places situated near the heads of estuaries with broad openings, the water quickly rose and fell through heights of from 6 ft. to 10 ft., nothing of the nature of a wave was visible upon the horizon.

Nor would such waves, although they were traveling with velocities of from 300 to 400 miles per hour, a rate dependent upon the average depth of the ocean in which they were propagated, be noticeable upon ships on the open sea that this might well be so, is easily recognizable when we state that although they might be 10 ft. or so in height, their length as measured from crest to crest approached 200 miles. These same waves, nearer to their origin on the South American coast, as with



ATCHISON, TOPEKA & SANTA FE RAILWAY HOSPITAL, TOPEKA, KANSAS.

over to the board of trustees on May 21, of the current year, and by them immediately turned over to the chief surgeon for equipment and opening. It was partially equipped and opened on June 22, in immediate charge of Dr. J. R. Fay the superintendent of hospitals for the association. Its construction is sandstone from Flagstaff, Ariz., for the first story and the stories above are of compressed brick. Its capacity is from 75 to 100 patients. There are three general wards with a capacity of 18 beds each, three small wards of from four to six beds and the rest is in single rooms. This capacity can be safely increased one third, if necessary to do so. The interior construction is of the most modern type. Its heating and ventilating apparatus is of the Sturtevant system, by fans propelled by electricity, by means of which the air in the entire building can be changed in 10 or 12 minutes, without the stirring of a feather held in mid air in any room; and in each ward or room occupied by patients the heat is controlled by the Johnson automatic heat control apparatus, by which the temperature can be maintained at any desired degree. Since its opening it has administered to a daily average of from 20 to 25 patients and the number is constantly increasing. Its patronage from outside patients has been at the rate of \$150.00 per month which is also increasing.

it was possible to have sent at earlier dates, and to note the consequences of the delay.

In notes and articles in local Japan papers, published on June 18 as mail summaries, and therefore printed in previous issues, we infer that on that date it had been ascertained that the loss of life reached 10,000, and that the time of the first inundation was at 8 p. m., on June 15. The next summary of news, dated one week later, tells us that the official returns of the dead from one prefecture only, on June 19, amounted to 25,043, the injured numbering 1,234, whilst the houses washed away or damaged were 5,030. From this and other notes the inference is that on June 20 it was a well-established fact that about 30,000 lives had been lost, some 2,000 were injured, and 12,000 houses had been wholly or partially destroyed; 60,000 poor people, mostly farmers and fishermen, had been rendered destitute, their fishing gear and boats having been washed away, and their crops destroyed, whilst survivors were in places feeding upon raw fish, which fortunately had been washed upon the shore. It is almost needless to say that foreign residents in Japan acted promptly on this information; subscriptions were raised, and relief despatched to the sufferers. The catastrophe seems certainly to have been sufficiently great for some of the many contributors to the columns of the

the waves of 1896 upon the Japan coast, as they rushed in upon the coast, piled upon the shallow shores and the heads of bays, until they burst as avalanches of water from 30 ft. to 80 ft. in height, to rush inland for a distance of one or two miles, carrying all before them. Just as a steamer going up a river withdraws the river from either shore to form the waves it leaves in its wake, in a similar manner an earthquake wave warns the inhabitants on a shore of its approach by a rapid recession of the water. In Japan, when this recession took place, it was dark, and therefore only seen by a few, some of whom sought refuge on high ground to look back, first, on a bare shore which they say emitted a curious phosphorescent light, and then on the white capped dusky mass which swept away all before it. Out at sea the waves were too long to be observed by fishermen, who, in the morning, put back to their harbors to find the sites of their villages represented by masses of sodden debris.

The origin of this vast waterquake was probably seismic. We incline to this opinion, first because it was preceded by the roaring noise which accompanies nearly all earthquakes in the inundated districts, and, in fact, is common to earthquakes propagated through rocky material in all countries; secondly, because the sound had hardly ceased before there was a violent shaking of the ground, which was sufficiently intense to be propagated as far as Europe, and possibly from pole to pole; and, thirdly, because it has been well established for many years that about 200 miles off the northeast coast of Japan on the southern edge of the Tuscara Deep on the line of the Mizo anticline there is a *centrum* from which the shakings which most severely disturb the northern half of Nippon emanate.

Other possible causes from the water disturbance would be a submarine landslide or volcanic eruption, but of these we have no evidence. Granting then that the Japan disaster is seismic in its origin, we have next to consider the extent to which a displacement in the earth's crust at the bottom of an ocean is likely to create great waves upon its surface, although a whale or a submarine boat submerged beyond a certain depth may move from point to point and not betray its presence by a ripple.

An alarmed fish shooting rapidly from a shallow to some deeper retreat, may create a disturbance on the surface that is quite perceptible. A brick suspended by a string in water three or four times its own depth, if it be dropped only an inch, will give rise to a pulsatory motion over the surface of the water in a comparatively large bath. The question as to whether the sudden movement of a mass of strata beneath an ocean will, or will not, produce a surface disturbance therefore depends greatly upon the size of the material moved and the depth of the water in which the displacement takes place. That the mass moved was large is testified by the enormous distance to which the shocks accompanying this movement were perceptible, and as the earthquake of 1891 was also recorded in Europe, it is not unlikely that it was comparable in its magnitude with the sudden displacements which took place on that occasion in Central Japan, the results of which remain for measurement, inspection and reflection to the present time. What then occurred was a mighty fracture, which can be traced upon the surface of the earth for a distance of from 40 to 60 miles. On one side of this fault, near its central part, the ground from which within a short distance there rises a mountainous country with peaks of 4,000 to 6,000 ft. has been lowered relatively to that upon the other side 20 ft. or 30 ft. Not only has there been vertical displacement, but lateral movement that has taken place; river beds have been compressed, as determined by the measurement of engineers before and after this great catastrophe, 1 or 2 per cent., whilst valleys have been so far narrowed that the surviving farmers demanded and obtained a new survey as the basis of readjustment for taxation.

We cannot say that a displacement of strata of this nature has taken place beneath the surface of the ocean off the north east coast of Japan, but if it has—and the surveys of telegraph engineers over ground where cables have been fractured, furnish abundant evidence of sudden and large changes in the configuration of sea bottoms—then we see in it the most probable cause of the chaotic ruin now existing in Dai Nippon.

As the body of our great earth grows cold she draws her dress around her both gently and with angry snatches. Lines of weakness have been established in her garment, and Japan unfortunately lies near to one of those which is often torn. This process of folding and tearing, and the sudden taking in of seams and tucks, is one that has gone on in the past and must go on in the future. That it

should go on, because it is compensatory to the universal effects of marine and subaerial denudation, which tend to reduce all countries to the level of the ocean, is a provision of nature beneficial to humanity at large: but that the brunt of the battle between the heavens and the earth should fall upon a progressive nation like Japan is a matter to be deplored, and commands the sympathy of all nations. The greatest destruction occurred at Kamaishi, which had a population of 6,000 and is famous for its deposits of magnetic iron. Eighty per cent of these people have been drowned, whilst four steamers belonging to the mines lie far inland but little injured, and 176 vessels of various description are at the base of the mountains. At the heads of the deep inlets which serrate this rocky coast there are about a dozen towns with populations approaching that of Kamaishi, and all have suffered. At Yamada, which is one of them, a fire probably produced by the overturning of a lamp by the earthquakes which preceded the waves, broke out to destroy that portion of the town which escaped the waves.

Shortly after the catastrophe, because the night was dark, the survivors and those from villages which had escaped inundation, lighted fires along the hillsides to guide those who were floating amongst and upon the wreckage towards the shore.

The scenes which followed the terrible effects of earthquakes, fire, and flood, the putrefying corpses, the searching for friends amongst bodies only recognizable by their clothing, the maimed, the starving and the helpless, must have tried the strongest nerves, and produced an impression upon the survivors which will be transmitted for many generations.

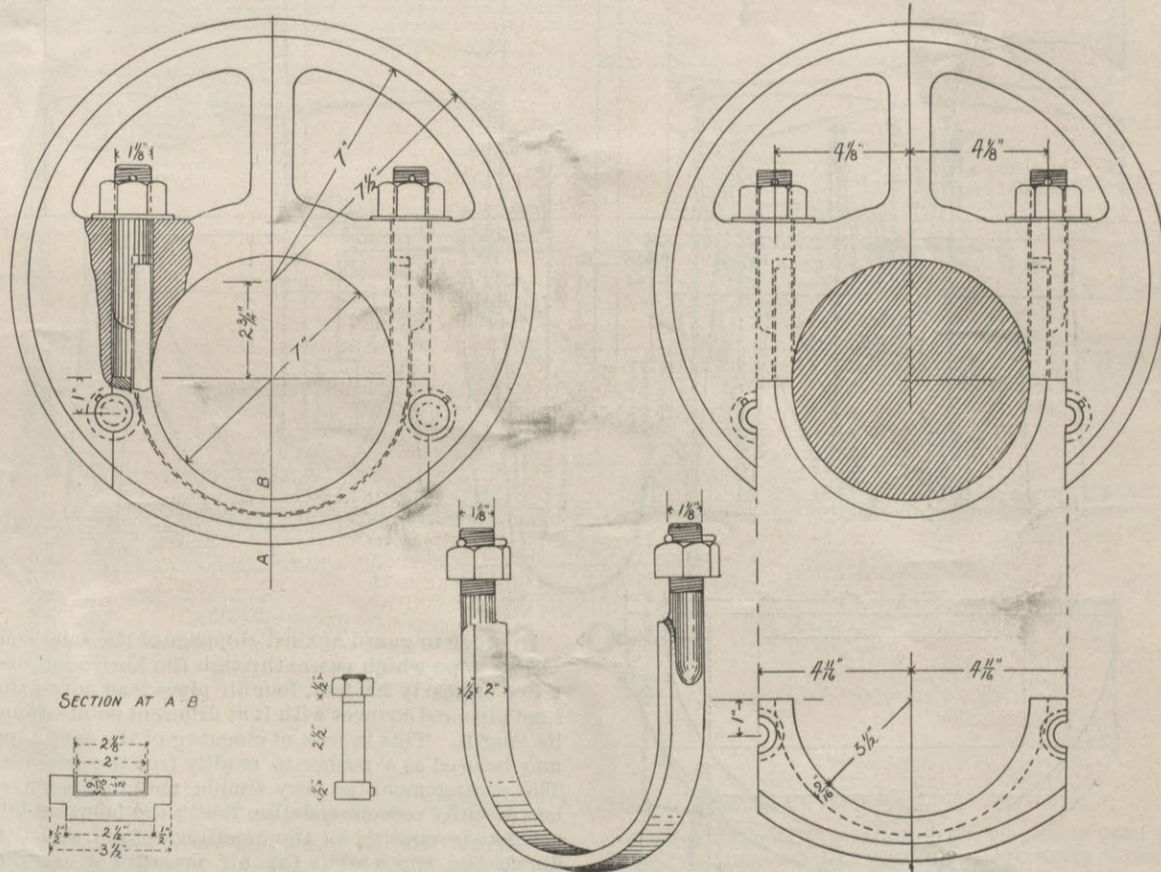
Now let us ask whether the engineer can avert these disasters? The answer is "No," but possibly he may mitigate them. The fact that the only three houses which remain standing at Kamaishi were

of solidity, majesty, and peace, the wonder of the engineer, the artist, and the sightseer.—[Engineering, London.

A NEW ATTACHMENT FOR ECCENTRICS.

A drawing has been received from Mr. C. Linstrom, master mechanic of the Yazoo & Mississippi Valley Railroad, Vicksburg, Miss., showing the construction of an eccentric designed especially for locomotive use, but which is also applicable to other forms of steam engines. The troubles occasioned by the loosening and moving of eccentrics upon locomotives on the road have led to the design of a number of devices for providing a secure fastening, and among them combinations of set screws and keys have been suggested and used. The employment of two set screws and a key has been advocated and extensively used. Some master mechanics have seen their way clear to do away with the key, and it is believed that those who have done so have not avoided this trouble with slipped eccentrics.

The accompanying illustration was taken from the drawing referred to, and it illustrates a simple device for securing an eccentric to its axle, and which the designer considers a satisfactory solution of the loosening problem. The eccentric proper is in the form of a disc composed of a main section with two abutting jaws so arranged as to receive a complimentary section after the main portion has been placed upon the axle. Two passages are cored in the main section to receive the threaded ends of a U-shaped yoke clamp in such a manner as to bind the yoke upon the shaft upon tightening the nuts. This clamps the main portion rigidly to the axle and the complimentary portion, the form of which is clearly indicated in the drawing, is held in position laterally by means of two small bolts extending transversely through bolt holes which are formed partially in the main and partly in the complimentary portion of the eccen-



LINSTROM'S LOCOMOTIVE ECCENTRIC.

storehouses, which relatively to the ordinary Japanese dwellings are substantial, structures suggests the idea, that solid masonry may at least palliate a disaster. After the wave of 1854, which partially destroyed the city of Simoda, further to the south, a sea wall was built which at least may save the town from waves of moderate height. The great point to be attended to when building along coasts subject to inundation of this nature is the choice of a site. If the site is unfavorable, a city may have to be removed. After the inundations of 1369 and 1494 such was the fate of Kamakura, a well known village to every sojourner in Japan. Here at one time stood a city boasting of a million people, the palace of a Shogun, the capital of the empire. Often was it laid waste by fire and sword, but its greatest enemy was the rebellions of the ocean. At the present time Kamakura is a quiet village, sheltered by sand dunes and crooked pines, whilst the capital of the empire is Tokio. All that remains to attest to the former magnificence of this pretty hamlet is a gigantic bronze image of Buddha, 50 ft. in height, cast more than 600 years ago, an emblem

of solidity, majesty, and peace, the wonder of the engineer, the artist, and the sightseer.—[Engineering, London.

Drainage Canal Excursion.

An excursion was given on August 15 by the Western Society of Engineers for the purpose of inspecting the work along the Chicago drainage canal. A special train was kindly furnished by the Atchison, Topeka & Santa Fe Railway, and when the train

charge for delivery, as any contract shop paying even one half the price quoted (68 cents per 100 lbs.) for labor would either have to reduce the cost or go out of business.

An objection, that can always be raised to railroad shop estimates, is, that they seldom if ever include any charge for superintendence, interest, depreciation or any other expenses which are large items in all manufactories, notwithstanding which, contractors are called on to meet these prices in competition.

CAR BUILDER.

SIGNALING AND INTERLOCKING ON THE UNION LOOP, CHICAGO.

The elevated railways of Chicago, consisting of the South Side, the Metropolitan West Side and the Lake Street Elevated Railroads of Chicago, now in operation, and the North Side Railway Company, which is preparing to build from Lake street north, have formed a company known as the Union Elevated Railway, for the purpose of erecting and operating a down town loop which will enable each of the four roads to deliver passengers in the business district. This loop consists of a double track with junctions at Wabash avenue and Van Buren, Fifth avenue and Van Buren, Lake street and Fifth avenue, and the necessary connecting tracks, cross-overs, etc. In addition to the three junctions mentioned, the Metropolitan four track railway which now ends at Franklin street will be changed so as to carry traffic south on Market to Van Buren, and the present interlocking plant at bridge junction will be

be secured with the minimum of delay in the manipulation of traffic.

The National Switch & Signal Company of Easton, Pa., has been given the contract for planning the system to be used and for designing and installing all the work, and it may be said to the credit of the general manager of the Union Elevated, Mr. D. H. Louderbach, that he has charged the signal company with the duty of presenting the most complete plans necessary to the safe movement of traffic regardless of cost of installation, and no expense will be spared to make the installation of these five plants complete and perfect. All switches will be considered as facing point switches and will be equipped accordingly and since it is not advisable to provide any physical protection in the shape of a derail or skotch block, the torpedo machine will be installed and operated in the same manner as a derail and each signal will be operated in conjunction with this torpedo signal, all torpedo signals having separate levers and connections from those operating the signals. The introduction of this audible signal will doubtless prove of great value in the operation of traffic over this complicated system of tracks as it gives immediate notice not only to the engineer but to all train hands when the first pair of wheels has passed the home signal set at danger.

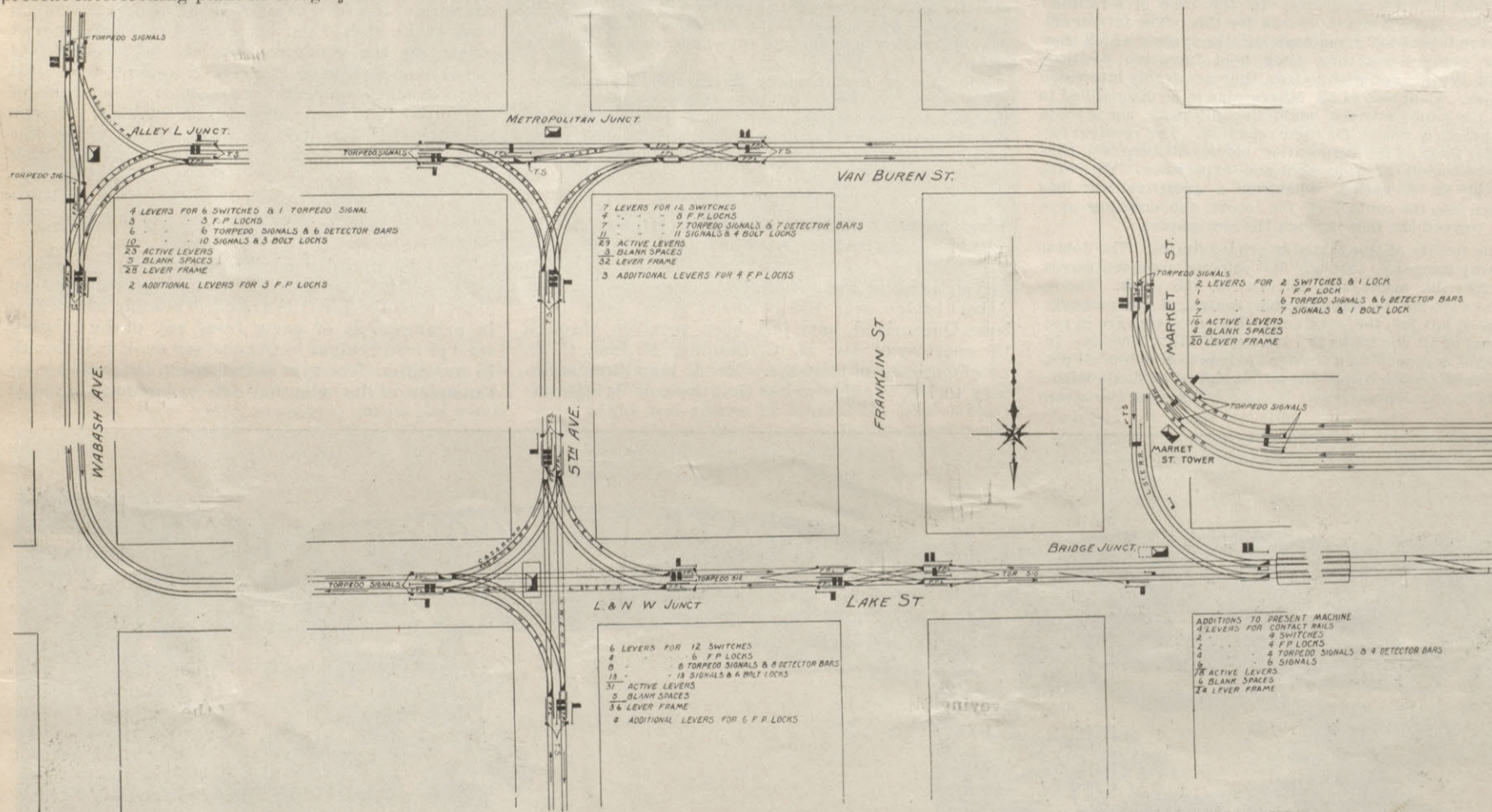
The moral influence of this torpedo signal is also considered to be exceedingly valuable, for since each torpedo machine is equipped with a certain number of detonators, and since the operator in charge of the plant is required to keep a complete record of each detonator delivered to him, it is not likely that

The operation of traffic around the loop will be entirely in the hands of the Union Elevated Railway, and as soon as a train from either of the four lines operated on the loop enters the limits of interlocking, all trainmen will be under the orders of the officers of the loop. It is expected that work will commence at once at bridge junction and Van Buren and Fifth avenue and be pushed to completion as soon as the structure is built on Van Buren street. The motive power to be used on the loop will be electricity operated in a similar manner to the Metropolitan West Side, there being a third rail carrying the current, which is supplied to the motor through a contact shoe which runs on this rail. The work is being planned by the signal company under the direction of Mr. Charles V. Weston, chief engineer of the road, and will be installed under the direction of Mr. H. M. Sperry, signal engineer and western agent for the contractors.

RAILWAY RECEIVERSHIPS AND REORGANIZATIONS.

In the address of President Moorfield Storey, delivered at the nineteenth annual convention of the American Bar Association, held in Saratoga during the current week, the speaker made an extended reference to the methods of reorganization of railroad properties now so much in vogue; and the evil attaching thereto. He said:

The great railway systems of this country have been built up and equipped with borrowed capital. Many of the securities represent investments of more than their



INTERLOCKING PLANTS, UNION ELEVATED LOOP, CHICAGO, BY NATIONAL SWITCH & SIGNAL COMPANY.

enlarged so as to operate the double crossover at Franklin and Lake streets. These junctions, together with a general plan of location of all switches and signals are indicated in the accompanying plan, which was prepared from a drawing received from Mr. Charles Hansel, vice president and general manager of the National Switch & Signal Company.

The volume of traffic which will be put upon the down town loop will probably exceed that of any railroad now operated. The number of trains now on the three railroads in operation is not less than 1000 per day and with the addition of trains from the north side, this traffic to commence with will not be less than 1,500 trains per day. The Alley "L", Metropolitan West Side and Lake street lines are operated right handed and in order that the traffic may be divided on the loop it has been decided to operate the loop left handed, the outer track being used by the North Side and the Lake Street and the inner track by the Metropolitan and Alley "L". By following the current of traffic on the several lines as indicated by the arrows, it will be seen that the crossing of the several points will necessitate the installation of a complete system of signaling and interlocking in order that the maximum of safety may

operators will allow motormen to pass signals at danger and explode detonators without making full report to the proper officer, and since the motormen know that such reports will be filed against them for disobedience of signals, he will not be likely to pass the signal at danger.

The machine at Fifth avenue and Lake street will be located in a tower spanning the tracks and will have forty levers; the machine at Wabash and Van Buren will be placed in a tower on the deck of the bridge and will contain thirty-two levers; the machine at Van Buren and Fifth avenue will be located in a tower south of the south track and will contain thirty-six levers; the machine at Market and Franklin streets will be located in a tower between the lines of Franklin street and will contain twenty levers; the additions to the present plant at bridge junction will involve twenty-four levers. The statements upon the drawing which are placed near the different junctions, give other information with regard to the signal functions which is not necessary to repeat here. All the signal towers will be fire proof, the machines carried on steel frames, and the towers equipped in the most complete manner with modern plumbing, heating and telephone connections

face value. Capital stock has been frequently issued without payment—often as a bonus to go with the bonds. In this way the money of creditors has been invested and the control of the property retained by the debtor—the railway company. Great systems of railroads have been built up by contracts between companies, sometimes in the form of leases and sometimes of traffic agreements, carefully drawn by astute counsel and providing for the protection of the properties thus consolidated in case of a failure to make the payments stipulated in the agreement; but the last three years have shown that these contracts cannot be enforced in the courts, that the rights that they are intended to secure are not recognized, and that, for all practical purposes, the creditor is at the mercy of the debtor and obliged to accept substantially such terms as the debtor chooses to offer. As matters now stand, counsel must advise their clients that they can draw no instrument of this character with the least assurance that its provisions will be respected.

The failure of a railway company finds the managers united and fully prepared for the emergency which they have inevitably foreseen, while it finds the creditors scattered, ignorant, frightened, and entirely unready to act. What has happened in practice? We have seen the managers, while stoutly denying up to the last moment that any such step was contemplated or that the property was in any way embarrassed, secretly prepare a bill in equity and without notice to any one interested, file it in a court

of the United States, asking for the appointment of receivers. As a matter of fact, in every case the proceedings have been collusive. The managers of the insolvent company have controlled both sides of the litigation. The bills have alleged that the company cannot meet its obligations and that thus the system will be disintegrated and the insolvent company suffer. Upon this allegation the company asks the court, in the interest of the debtor, to deprive the creditors of their rights or at least to restrain the creditors from exercising them. The representatives of the debtor ask that, to preserve for it property to which confessedly it is not entitled, the creditors be deprived of that to which they are entitled. To disguise the naked effrontery of this position, the bills generally allege that the public interest will suffer from the disintegration of the system, but it may be doubted if there is any ground for this claim. It certainly has never been established after argument, for no opportunity to litigate it has been given. If it is for the interest of every one concerned that the railroad should be run, there is little danger that the public will suffer from an interruption of service.

Again, the selection of receivers is a matter of the deepest concern to a great many persons. They are to be the trustees, for the time being, of many different and conflicting interests, and are bound to hold the scales with absolute justice between them. There should be no undue haste in the choice of such officers. A restraining order will hold everything until after notice and hearing, leaving the property meanwhile to be managed by its officers as before. Every bankrupt or insolvent law that we have known has left the choice of assignees to the creditors and no reason exists for not applying this rule to railway receiverships.

The salutary rule of equity has been that whoever else is to be selected the former managers of the property shall not be made receivers. In the case of a railroad company there is special reason for this. The former officers are interested in maintaining the system which they have brought together, they hold lucrative positions which they do not wish to lose, they are deeply interested parties. Such men of all others should be disqualified to hold the scales between conflicting interests, nor is there any practical reason for their selection. The receiver can employ them as the corporation employed them, and thus get the benefit of their skill and experience. Yet, with scarcely an exception, whenever a great railway has passed into the control of the court, the creditors have first learned the fact through the newspapers.

The results of this first step are inevitable. The debtor railway company, through its selected representatives, becomes the agent and advisor of the court. The receivers are left in irresponsible control of the property. What is left for the creditors? The receivers are in possession of all the books and control all the witnesses. Instead of approaching a trustee anxious to give him all possible information respecting all his rights, he deals with a party to the controversy. Instead of finding receivers

and in fixing it there is no one to audit the accounts, no one to represent the creditors who suffer while their trustees profit. Whenever an agreement is reached the obstruction ceases. The foreclosure proceedings move swiftly and the officers of the court no longer resist the claims of suitors at the bar. The receivership has accomplished its purpose.

Proceedings like this are of very evil example. Many a man sees the savings of a lifetime swept away by the mismanagement of a corporation and sees the managers continue in charge in spite of all opposition that creditors can make. To the reckless use of power by the managers of great corporations and by those who profit in their downfall we must attribute much of the discontent, the hatred of capital and capitalists, of corporations and their officers, which underlies the movement which now excites our alarm.

It is to the courts that we must look for protection. Their authority rests peculiarly on the respect of the people for their absolute impartiality, and in the long run they cannot preserve that respect unless they observe the well settled rules of judicial procedure and unless they respect and enforce every legal claim. Parties must be left to determine for themselves whether their interests will or will not be served by the assertion of their rights. The moment that the courts undertake to vary their contracts or deny their rights, that moment the confidence of the community receives a shock, and no man knows on what he can rely.

If the courts had always refused to entertain these applications for receivers when made by the debtor corporation, or even if they had selected impartial receivers and facilitated the enforcement of every agreement, railroads would have been reorganized more promptly and on a more enduring basis than is now possible, while the confidence of the community in the efficacy of law and the sanctity of contracts would have been far greater. Judicial action which impairs the obligation of contracts is more dangerous than any statute which aims at the same results.

When the court, through its officers, undertakes to manage a railroad for years, and that chiefly without hearing the questions which arise in its operation; when it appoints these officers, and in so doing grants the final relief sought without notice, it violates the fundamental rule of our constitutional system.

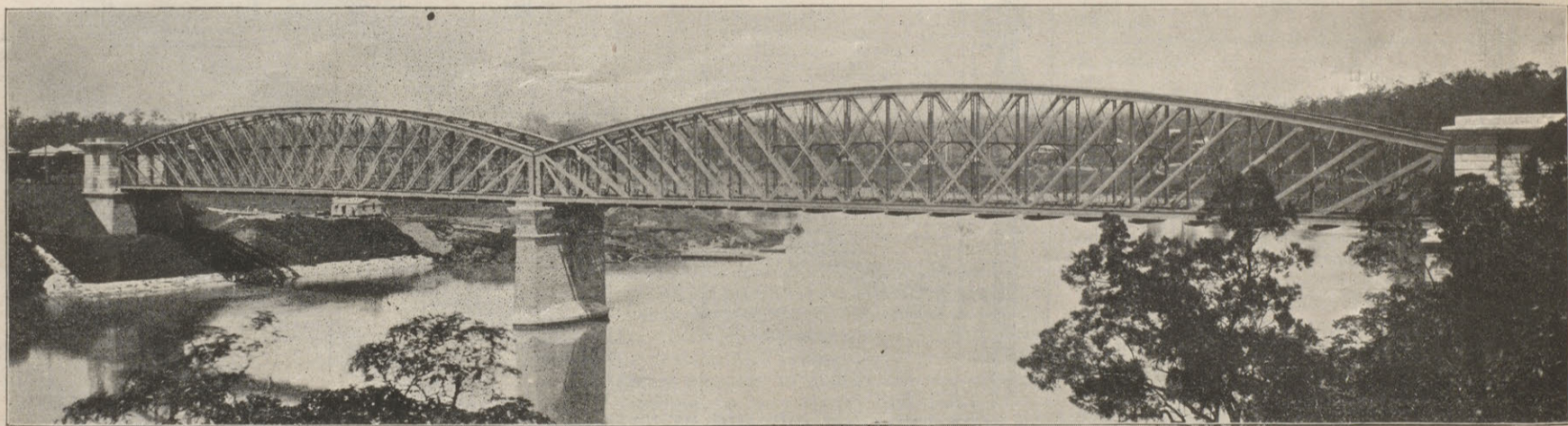
THE NEW ALBERT BRIDGE, NEAR BRISBANE, AUSTRALIA.

A description and set of photographs of the New Albert bridge over the Brisbane river, near Brisbane, Queensland, have just been received through the courtesy of Mr. H. C. Stanley, M. Inst. C. E., chief engineer of railways. Mr. A. Hamilton, secretary to Mr. Stanley writes that the new bridge was

erected that the recovery and re-instatement of the submerged superstructure was prohibitive principally owing to the cost. In order to utilize the remaining portion of the bridge a design was prepared for the erection of a structure similar to that of the old bridge, but this was afterwards abandoned and a design submitted by the chief engineer for an entirely new structure consisting of two long spans and one central pier adopted with the object of avoiding the obstruction caused by the numerous piers which has proved a source of weakness in the original bridge. This latter structure consisted of a series of eight spans varying in length from 40 to 160 ft. resting upon abutments at the shore ends and upon seven cast iron cylinder piers between them. This bridge was completed in July, 1876, at an expenditure of \$260,000 and took 2½ years to construct. The working drawings were prepared by Messrs. Robinson and I'Anson Darlington, from designs furnished by the chief engineer, and the material including the cast iron cylinders for the piers was all imported from England.

Before arriving at any decision the design for the new bridge was referred to the commissioners at the instigation of Sir Thomas McLlwraith, for the opinion of Mr. Whitton, M. Inst. C. E., late engineer in chief of railways, New South Wales, who after careful consideration signified his entire approval of it. The design consisted of a double line of railway bridge of two spans 340 ft. each supported in mid-channel upon a central pier and erected at a level of 5 ft. 6 in. above that of the old bridge. As the main strength of the flood waters is along the northern bank at the site of the bridge and a back current caused by the configuration of the ground sets strongly up stream on the southern side the central pier was placed in such a position as to be clear of the full force of both currents. A series of borings having been taken upon the proposed site of the pier and it having been ascertained that a solid rock foundation could be secured the working drawings were put in hand in April, 1893. Tenders were afterwards invited and a contract let in the following August.

The type of girder selected for the superstructure by the chief engineer is one having a curved top chord with the Linville system of bracing and differs in arrangement of parts from any of the existing steel or iron bridges in Queensland or, it is believed, in Australia. The type is in modern favor, as recent examples of its adoption are to be found in Great



THE NEW ALBERT BRIDGE, NEAR BRISBANE AUSTRALIA—FIG. 1.—COMPLETED STRUCTURE.

whose only object is to deal justly with all and who have no personal interests he finds men definitely committed to a policy and determined to carry it out.

Where creditors representing mortgagors or lessors have sought the independent control of their property and have pointed to the letter of their contract, in every case their application has been opposed by the receivers, who have resisted the application of the parties in interest for the appointment of a separate trustee to represent a definite interest. As official advisors of the court, the receivers sit by its side on the bench, while at the same time they appear before it as parties. Sometimes the receivers have resisted foreclosure proceedings and all attempts by creditors to assert their contract rights which could lead to the disintegration of the system. This has resulted in a practical denial of justice. The debtor railway company has been left in possession not only of its own property, but of other properties to which its right has been forfeited, and thus the court, through its officers, holds creditors at bay until they are ready to compromise their rights.

After a long and expensive contest the self-constituted reorganization committee appears and bondholders are offered their choice between a contest conducted at great disadvantage and expense and the acceptance of such terms as may be offered. While in theory they need not accept, in fact they do not dare to refuse. The expense of the reorganization has been in many cases enormous,

built to replace one which was carried away in February, 1893, by a flood, and that the new structure was designed with a view of being clear of any high water which may occur in future. The bridge is located on the main line of railway connecting the capitals of Queensland and New South Wales, at a distance of five miles from Brisbane the capital of the former colony. The engravings show a view of one of the spans when ready for launching, and one of the north span, one end of which has been lowered upon a trestle pier built upon the deck of a ship which was dismantled for the purpose of supporting the river ends of the spans while being towed into position for lowering upon the center pier. The third shows the completed structure.

Immediately after the disastrous flood of February, 1893, by which the northern half of the bridge across the Brisbane river at Indooroopilly was destroyed, the question of the best and speediest means of restoring the interrupted communication received the most careful consideration. A proposal to put a light suspension bridge across the breach was not favorably entertained, as it would have been in the way of the works necessary to restore the structure. After a searching examination by divers it was de-

Britain, America, India and Holland, the last named country affording a notable one in the Kuilenburg bridge, spanning over 500 ft. The bridge besides being the largest riveted structure in Australia is entirely of colonial design and manufacture. The spans of the Hawkesbury bridge are of a greater length, some being as much as 416 ft., but it was built and designed by an American company and manufactured partly in England and partly in America. The main difference between American and English practice in bridge construction is that the former employ single pins of large diameter for the connections of the various members while the latter prefer the smaller and more numerous rivets. Facility of construction is claimed for the one, rigidity of form for the other. The above named bridges are thus representative of the two methods. There are also several other details in which differences from usual practice exist, such as the attachment of cross-girders, protection against derailment, provision against violent wind storms and free expansion under varying temperatures. Professor Warren of the Sydney University was consulted by the chief engineer in reference to the calculations necessary to determine the proportions of the girders and other

parts of the structure and signified his approval of them with some slight modifications.

What may be regarded as the most important part of the work is the foundation of the central pier. This will be realized from the fact that it will have to support, under a maximum load, a weight of nearly 7,000 tons. The base rests upon rock at a depth of 81 ft. below high water mark, of which 56 ft. is in water and 25 ft. in gravel, sand and rock below the river bed. The total height of the pier from the base to bedrocks is 130 ft. and will give a clear height of 49 ft. from high water mark to under side of main girder, or 7 ft. above the level of the flood of 1893.

The caisson which forms the foundation of the pier was constructed of an outer and inner shell braced together and forming between them a hollow water

the form of the pier from that of an eclipse to a rectangle which in turn is gradually contracted to the level of the bedrocks by battering the sides and down stream end. The up stream end is built vertically and protected by a granite cutwater. Granite bed stones weighing some five tons each are built into the top of the masonry for the purpose of carrying the steel bearings upon which the whole weight of the superstructure is supported. The masonry of the pier was completed to the level of the bed stones on Wednesday evening June 26.

The new superstructure involved the highening and widening of the abutments so as to suit them to the larger structure. It therefore became necessary to remove a large portion of the outer masonry of the old abutments, leaving the remainder as a core around which the extended new masonry was built.

working load permitted in the various members will vary according to the work they have to perform from 4.5 to 7.0 tons the square inch. Upon the top of the cross girders are placed four troughs to carry the rails that will be spiked to ironbark longitudinals bedded on bitumen and sand. In the event of a derailment the sides of the troughs will act as guards and prevent the precipitation of the train to the floor of the bridge or against the girders. The whole of the trough girders are strongly connected together transversely to prevent oscillation by steels Ts to which the planks forming the deck of the bridge are bolted down.

The total weight of steel work is nearly 1,200 tons, including the weight of the bearings. The latter are of two kinds, one fixed and the other free to provide for movement in the girders by expansion or contraction to an extent of 3 in. in either direction. The fixed bearings are constructed of 9 in. steel pins accurately turned, and act as rockers in order to allow of freedom of motion due to deflection or longitudinal travel. The free bearings are of similar construction except that they rest upon a series of seven segmental rollers accurately turned so as to bear truly upon the planed surfaces of the saddle and lower bedplate.

A footway 5 ft. in width is carried upon cantilevers attached to the up-stream girders, and at either end is connected by footpaths to the public road so as to afford access for passengers at all times. The bridge has been erected according to the design and under the supervision of the chief engineer of railways, Mr. H. C. Stanley, M.Inst. C.E., assisted by Mr. F. L. Keir, who is the resident engineer on the works, and who had also charge of the preparation of the working drawings and specification. The contractors are Messrs. McCormick & Son, who have carried out the manufacture of the caisson and superstructure in their own workshops which they erected at the site of the bridge. The plant and machinery used in the shops were specially imported by them for the purpose. The total cost of the bridge was about \$330,000.

COUPLER REPAIRS.

To the Editor of the Railway Review:

The circular issued by the M. C. B. Association under date of August 3, 1896, regarding the replacement or repair of M. C. B. couplers or parts thereof is well timed and just. It only omits one essential feature, and that is, that the owner of the car on which the repair or replacement becomes necessary should not be charged for its cost unless the repair or replacement is made by a manufacturer who has a right to make and sell the coupler or broken part thereof.

The owner of the right to manufacture or sell the particular device is entitled to protection at the hands of the user; and before making any allowance for such replacement or repairs, the user should be thoroughly satisfied that such replacement or repair is done by some party who has the right to manufacture and sell the parts replaced or repaired. In default of such precaution the user may become liable as joint infringer. The user certainly cannot charge manufacturers' prices as quoted unless the articles charged for are manufactured by one who has the right to manufacture.

Aug. 18, 1896.

Roadmasters' Association of America.

The fourteenth annual convention of this association will be held at the Cataract House, Niagara Falls, September 8, 9, and 10, 1896. Committees have been appointed to report on the following subjects:

"Tie Plates," Robert Black, chairman.
"Best Method of Protecting Facing Point Switches," W. D. Otis, chairman.
"Paper on Ditching," J. M. Meade, A. T. & S. F., Pueblo, Col.

"Elevation for Each Degree of Curvature, for Speed of 10, 20, 30, 40, 50, 60 and 70 Miles per Hour and the Advisability of Using Easement Curves," Garret Davis, chairman.

"Latest Improvement in Frogs and Switches," J. A. Lahey, chairman.
"Rail Joints," C. F. Blue, chairman.
"Ballast," W. H. Courtney chairman.

Arrangements have been made with the Pullman and Wagner Companies for half rates to members and their families. The secretary will, at the convention, issue certificates of attendance, to secure the return fare free. The committee of arrangements, Mr. W. D. Otis, chairman, has arranged a very pleasant program of entertainment. This program will be distributed during the first day's session. There is every reason to expect a large attendance and each member is urged to make a special effort to attend that he may gain some knowledge valuable not only to himself, but to the company he represents.

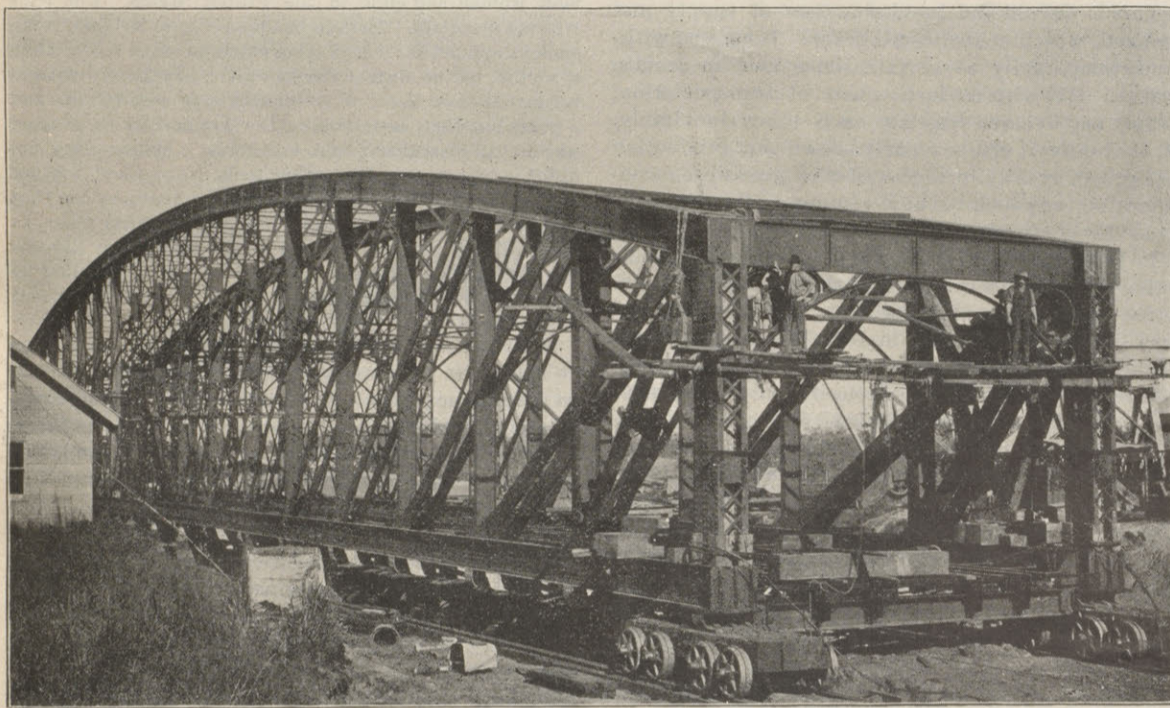
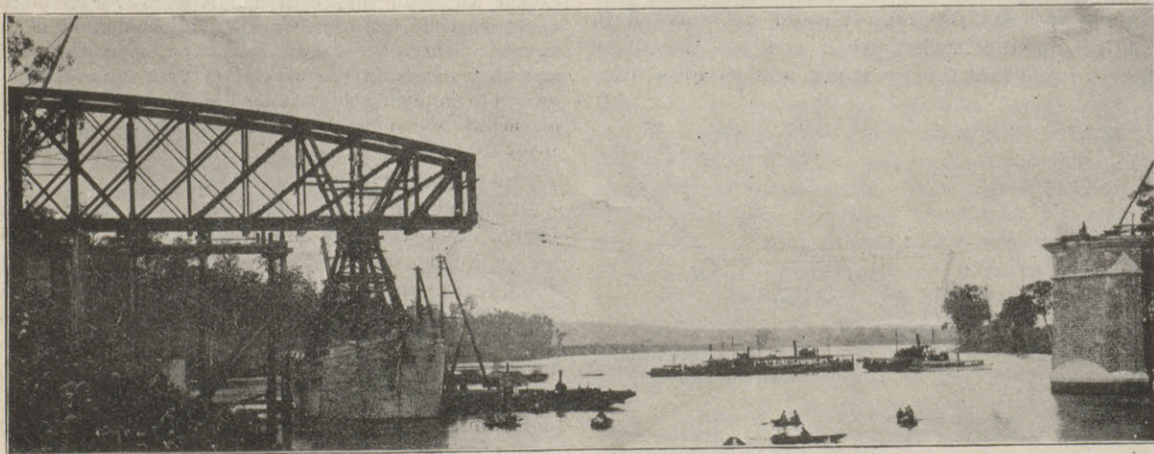


FIG. 2.—NORTH SPAN READY FOR LAUNCHING.

tight space 4 ft. in width which converged at the base so as to form the cutting edge. It has two cross walls, also water tight, extending across the width of the caisson between opposite sides of the inner shell, forming three working chambers for the removal of the dredgings. The complete caisson weighed 230 tons and the lower 20 ft. of it, weighing about 70 tons, was launched June 27 of last year. It was brought into position for sinking on August 9, the sand and gravel enclosed within it being removed by dredging. On October 20 following it touched rock, which was then removed by divers, thus allowing the caisson to sink into the rock to an average depth of 2 ft. This part of the work being performed under water at a depth of 80 ft. below the surface,

The building of these abutments was commenced in October 1893 and they were both completed to the level of the bed stones in May 1894. The parapets have not yet been completed, owing to the necessity for previously placing the superstructure in its permanent position. Both the abutments and central pier are built of ashlar masonry facework with cement concrete backing. The freestone used was obtained from Pearson's Helidon quarries and the blue stone in the concrete from Jenkin's Bundamba quarry. The granite in bed stones and cutwater quoins is from Mount Crosby. The superstructure is entirely of mild steel with the exception of the footway girders which are of wrought iron. The main girders are 340 ft. in length over all, divided



THE NEW ALBERT BRIDGE—FIG. 3.—NORTH SPAN AFTER LAUNCHING.

was necessarily tedious and hazardous to those employed, and the contractors experienced much difficulty in obtaining divers able or willing to undertake the work. On February 19, 1895, the cutting edge, after inspection, was found to be bearing uniformly upon the rock, and the work of filling the caisson with concrete was commenced and by March 27 the whole was filled in and ready to receive the masonry. As it was intended that no portion of the ironwork should be visible above low water mark, a temporary top was fastened to the caisson so as to allow of the masonry being carried up to high water mark within it.

Above high water mark an intake course reduces

into 20 panels of 17 ft. each by vertical struts to the lower ends of which the cross girders are hung. The central depth of the main girders is 41 ft. 6 in. which is reduced to 21 ft. 6 in. at the ends. Web bracing connects the top of each post with the foot of the next but one to it, thus crossing the intermediate post at or about the center.

All the principal connections of the various members composing the girders are made by machine closed rivets inserted into solid drilled holes carefully laid off from templates. Only in certain instances was punched and reamed work allowed. The steel was tested up to a breaking strength of 30 tons on an average, and the unit stresses under the maximum

THE RAILWAY REVIEW

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CHICAGO, SATURDAY, AUGUST 22, 1896.

ATTENTION is called to an abstract from the address of Moorfield Story before the Bar Association of the United States, concerning the methods at present in vogue in connection with the reorganization of railways. A statute designed to correct some of the evils now current in this connection was recently enacted in Kentucky and formed the text of of the speaker's remarks.

WE ARE not especially concerned, except as with an interesting engineering subject, as to the outcome of the contention of compressed air with electric traction for the propulsion of street cars. Air power transmission, however, is so thoroughly established as a factor in manufacturing and in railway shop operation that such questions as the relative efficiency of high and low pressure for storage transmission ought to be settled before expensive mistakes are made in the installation of apparatus. Authorities differ widely upon the question as to what pressure should be employed and it is time that something positive should be learned by experiment on a practical scale between the two systems. Mr. R. A. Parke in a paper which appeared in our issue of last week advocates the employment of moderate pressures and frequent charges of the storage reservoirs as being more efficient than the extremely high pressures contended for by engineers who are interested in the promotion of air traction. If the high pressures are recommended because of the possibility of making longer trips between chargings and if this advantage is accompanied by losses in efficiency which would render the system more expensive than it would otherwise be, the fact should be shown and the truth should be known if frequent air compressing plants are necessary. In contrast with Mr. Parke's statement is the following from Herman Haupt of New York. "I assert confidently that there is no system that can compare favorably with high pressure compressed air, either in cost of plant or economy of operation." A pressure of two thousand pounds per square inch is referred to by the term high pressure in this case and the statement is made that while there is a loss of power in any degree of compression above that required in the motor cylinders the additional power required is not in proportion to the increased degree of compression. As showing that leakage is not necessarily troublesome Mr. Haupt quotes an experiment made at Sandy Hook in which a reservoir charged at a pressure of two thousand pounds pressure of air was exposed for more than a year and at the end of that time the pressure was reduced only 10 per cent. This however must be considered an exceptional case and piping must be unusually well constructed to give such results. As it would be highly valuable, besides the scientific interest of the question to know just what the compression losses are it is hoped that the matter may soon be made the subject of investigation.

THE CRIME OF PROGRESS.

The persistent statement made by the advocates of free silver, that silver was demonetized by the "Crime of '73," has led many to believe that the present relative positions of silver and gold are really due to a powerful conspiracy. It is perhaps natural for producers, whether of agricultural or mineral products, to ascribe a continuous decline in prices to the manipulation of other classes. The man who fails in business is always prone to ascribe his failure to other than the real causes. If any business is continuously overdone so that the supply of its product becomes greatly in excess of the demand, prices must fall until the demand is stimulated, naturally or artificially; or until the supply is reduced.

This is the old and inevitable law of supply and demand, which underlies all trade. It may be withstood temporarily at certain times and in certain places. But with modern means of transportation, supply and demand regulate each other inevitably. If, therefore, it can be clearly shown that production has grown greatly in excess of the growth of consumption, why look for any remote and speculative cause for decreasing prices.

In 1875 there were 26,381,512 acres of wheat cultivated in this country. In 1891 there were 39,916,987 acres—an increase of 50 per cent. In 1875 the yield was 202,136,000 bushels; in 1891 it was 611,780,000 bushels, and even the poor crop of 1895 yielded 467,100,000 bushels. This tremendous increase has been far in excess of the increased demand for home consumption. It would not, however, have been sufficient to account for the great depreciation in price in the world's market, were this all. But during this time, Russia, India, Australia and Argentine have increased their product of wheat in similar proportion. The result is inevitable that lower prices must prevail until production is in some way curtailed or consumption is stimulated in a corresponding degree.

The same law is equally powerful in the case of all manufactured commodities, and in services of any kind, like transportation, for instance. Why should it be expected that this law should be suspended in the case of, or for the benefit of one certain product of the mines, like silver? Is it surprising that the attempt to accomplish this through the Bland and Sherman bills had only a very temporary and limited effect? It would require a miracle to effect it and the laws of nature cannot be suspended by legislation.

The producer of any commodity would naturally like to have an exception made in his favor. None of them have, however, succeeded in securing the intervention of the government except the silver miner. In the attempt to favor this special class, the United States has bought bullion, which inventoried at its present market value shows a depreciation of over \$145,000,000. It could not succeed in holding up the market price; and yet the silver miners insist that this great tax, and one even enormous

larger shall be levied upon the people of the United States, for their exclusive benefit.

The diagram which we publish, shows graphically the influence of the increasing production of silver, upon its market price. It tells the whole story. If there has been a "crime against silver," then there has been a crime against wheat and other agricultural products, against iron and manufactured materials in general, and against railroad transportation.

Secretary of agriculture, J. Sterling Morton, puts this forcibly and pertinently:

"If there was a conspiracy in 1873 against silver, there was a crime against the flatboat by the steamboat, and a crime against the steamboat by the railroad, and against the horse by the trolley car and bicycle. We have enough silver dollars now to put \$5.50 into the hands of every man, woman and child in the United States. But they will not circulate. Modern business cannot be done with ancient appliances. A mowing machine costs more than a scythe, but no farmer thinks that a scythe is cheaper because it costs less. A locomotive may cost \$10,000 and a horse but \$100; nevertheless the locomotive is a more economical instrument than the horse. Money does not differ in this respect from other tools. No one who wielded an axe would choose one thirty times as heavy as one that was equally good, although the latter cost thirty times as much. Every one who drives a plough selects the lightest one that will do the work. The term "cheap" applied to money is no recommendation unless we take efficiency into account."

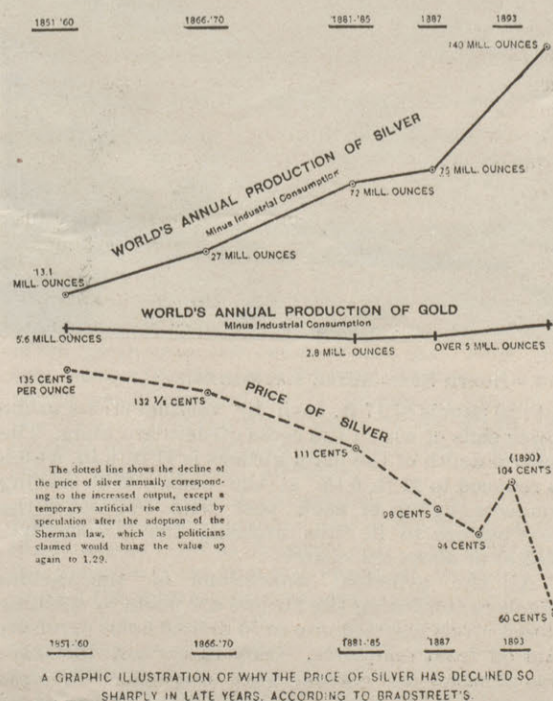
We recommend to those who have been inclined to believe in a conspiracy and a crime against silver to peruse the speech of Senator John Sherman, delivered at Columbus, Ohio, August 15. It is as far as possible from being a political harangue, and it is not wise for any one to let his political prejudices debar him from reading such a clear and comprehensive history of gold and silver coinage. His statements are facts which cannot be controverted. If there was any crime against silver it was not new in 1873. All the talk about the "money of the constitution" is simply intended to deceive those who have not read the constitution of their own country. The only allusion to the subject in that document is that giving congress "power to coin money." In 1806 President Jefferson stopped the coinage of silver dollars because, following the inevitable course, the new and good coin of the United States went to Europe to be hoarded, while European silver coin, badly worn and abraded, continued to form the circulating medium of this country. This, Senator Sherman says, the populists should call the "crime of 1806" to be consistent. No silver dollars were coined for over thirty years. In 1834 congress adopted the ratio of 16 to 1, which somewhat undervalued silver, and hence little was coined. The avowed purpose of the law was to make gold the standard. The report of the committee of the house of representatives said:

The committee thinks that the desideratum in the monetary system is a standard of uniform value; they cannot ascertain that both metals have ever circulated simultaneously, concurrently and indiscriminately in any country where there are banks or money dealers, and they entertain the conviction that the nearest approach to an invariable standard is its establishment in one metal, which metal shall compose exclusively the currency for large payments.

This was the "crime" of 1834.

In 1853 silver dollars had disappeared from circulation. Congress, by law, reduced the amount of silver in fractional coins over 6 per cent, and made them legal tender for \$5.00 only, thus leaving gold practically the only legal tender. The intention to make gold the standard coin was expressly avowed by congress. This was the "crime" of 1853. The total disappearance of both gold and silver from circulation during the war and some time subsequently and later legislation on the subject are familiar.

From 1792 to 1893 the total number of silver dollars coined was 8,031,238. Under the act of 1873 trade dollars to the amount of 35,965,924 were coined; and under the Bland-Allison act 430,790,041 silver dollars were coined—fifty-four times the entire amount coined previous to 1873. And yet owing to new discoveries of ore, improved processes and machinery, the value of silver has declined until now the world over thirty ounces of silver will only buy one ounce of gold. The United States with 379,000,000 silver dollars in its vaults represented in circulation by silver certificates, and \$118,000,000 in silver bullion, represented by treasury notes, has been able to maintain its silver money



at par with gold simply because it has had a monopoly of coinage and could limit it. The free silver advocates propose to destroy this power and to coin an unlimited amount of silver dollars. With these figures as to the production of silver and its market value, it is difficult to see how any sane man can believe that such a law would raise the price of silver to a parity with gold on the 16 to 1 basis, which is now ancient history.

THE ATLANTIC CITY COLLISION.

The frightful railway collision at Atlantic City, New Jersey, has been discussed and studied until it may be said that the tributary causes may be outlined with certainty of correctness. The accident occurred July 30, and resulted in the death of forty-six persons and the injury of about sixty. The circumstances were such as to lead to an expectation of immunity from such disasters, because of the protection which should have been afforded by the interlocking apparatus at the crossing where the wreck occurred. Important lessons may be learned from the case and it seems incumbent that railway managers should accept the warnings offered and emphasized by such a disaster.

We find that it is the worst accident which has occurred in this country for eight years. It took place at a crossing at grade between the Pennsylvania and the Philadelphia & Reading Railroads at a point about two miles from Atlantic City. The crossing is between a single track on the Pennsylvania and a double track on the Reading, the angle of the crossing being fifteen degrees, which is very acute, and the tracks being parallel for several miles east of the crossing. The close proximity of the lines at this point naturally led to trials of speed between the roads and it is highly probable though not certain that this fact contributed to the conditions which culminated in the accident. The crossing is equipped with interlocking apparatus with home and distant signals but no derails. The home signals on the west side of the crossing are one hundred ninety-seven feet from the frogs and on the Atlantic City side they are one hundred seven feet from the frogs. The west distant signals are one thousand fifty feet from the crossing and on the east side they are nine hundred fifty feet away. Electric annunciators gave warning of the approach of trains in all directions when they were about a mile from the crossings, which is an ample distance.

The trains concerned were an express on the Philadelphia & Reading and which was practically on time and approached the crossing at a speed of about sixty miles per hour, and a slow excursion train on the Pennsylvania. The details of the collision itself, while interesting, are not of value in showing how to avoid repetitions of such disasters, and we shall consider only the causes which led up to the wreck. The evidence given before the coroner showed conclusively that the Philadelphia & Reading train had been in the habit of approaching this crossing at high speed and of nearly always finding the signals cleared for it. It is believed that only once in three years had this train been slowed down at the crossing by the signals, and there was nothing in the evidence which would tend to show that the Reading express had been given the signals in this case and that they had subsequently been changed and the way cleared for the excursion train. It was a clear case of disregard of signals. It seems that while the rules provide that preference between trains of the same class shall be given to those of the Philadelphia & Reading the towerman had cleared the signals for the excursion train which was moving slowly and probably had rung its annunciator first. The express train did not find its signals cleared and yet its speed was not checked until too late to stop and hence the collision on the crossing. Evidence showed that the brakes were applied—but too late. Also it was shown that the engineman of the express blew his whistle before reaching the distant signal after which he blew the acknowledgement signal, two short blasts. It is apparent that he did not expect to be stopped even though the signals were against him when he sighted them and when he arrived at the distant signal.

There are several features of the disaster which should be studied by railway men and specially by

those having charge of enginemen and signal operators. The first is the question of derails. Such switches are most valuable in impressing the necessity of obeying the indications of signals. This is believed to be their greatest recommendation and a superintendent of a western road used to say that his most reliable engine runners were men who had been discharged from other roads for getting their engines off at derailing switches, for the reason that they would regard signals after such experience. The moral influence of the certainty of getting the train upon the ground by passing a danger home signal would probably have caused the runner of the express to slow down at the distant and stop at the home signal. The distant signals in this case were too near the crossing. This also applies to the home signals which should not be nearer than three hundred and fifty feet from the fouling points. The Illinois law requires this distance for home signals and a space of twelve hundred feet between the home and distant signal. These are short enough and they have proved to be too short for high-speed trains, so that the question of increasing these distances is being seriously considered. There is opportunity for speculation with regard to the influence which electric locking would have had in this special case, but it is inferred from the investigation that the operators had sometimes been guilty of changing the routes, or after they had been set up for a train on one of the roads, putting these signals to danger and clearing those on the opposing line. The possibility of doing this at a large majority of interlocking plants constitutes a danger, the serious character of which is little understood. If an operator changes his signals in the face of a high speed train he is likely to cause such a wreck as the one under discussion.

The coroner's jury and others place great stress upon what is termed the operator's lack of good judgement in not passing the express train first, as he had been in the habit of doing. The day operator is reported to have testified that he had not delayed that train for three years. It is probable that the excursion train rang its annunciator before the express and that the operator thought that it would be able to clear the crossing before the express came up. If the slower train rang the annunciator first the man must be considered as justified in his action. What are signals for but to stop trains when necessity for doing this arises? Again, why are enginemen relieved of the responsibility of observing signals merely because they happen to run fast trains?

The express was accustomed to have smooth sailing and expected to have the right of way. This may have led the engine-runner to expect the signals to be cleared while he was within their limits, or he may have been afflicted with that strange and often fatal absentmindedness which lie at the bottom of many railway horrors. It is by no means uncommon that runners become so accustomed to finding clear signals that they do not discover them when put in the danger position. The writer has witnessed experiments to ascertain the perception of runners, who were considered specially careful, by purposely putting an outlying switch signal of the semaphore pattern into the danger position before the men could have sighted it. This signal had been in the clear position for many months, as the switch was seldom used, and in several cases no attention was paid to the indication, which goes to show the strength of habit. The habit of observing signals is one which every effort should be made to acquire, and though it delays trains it is an excellent plan to occasionally leave signals in the danger position long enough to cause enginemen to reduce speed. It is considered by some as good practice to change signals from danger to safety positions in the view of enginemen. This is open to doubt, however, because enginemen may come upon such signals under too high speed, expecting them to change in their favor, and this objection is involved in the case under consideration.

The importance of defining the indication and of properly regulating the use of the distant signal cannot be too strongly urged, and in conclusion it is pertinent to observe that derails have a good influence upon runners, and the objections raised to them are largely imaginary; that in locating signals care should be used to get them far enough back from the fouling point; that electric locking will not permit

of question as to the practice of changing routes in the face of approaching trains; that enginemen should be guarded against the expectation of always finding signals clear for them; and the rules governing the operation and the indications of signals should be brought frequently to the minds of all employees who are concerned with them by examinations and discussion with the proper officers.

REGULATION OF COMMERCE.

The Kansas Railroad Commission is well known for its fairness and moderation in dealing with railroad matters, and the following expression of its views upon the troublesome question of rates is therefore of general interest.

Among the many problems involved in the regulation of commerce there is none more difficult of solution than that of determining what carriers may reasonably charge. It would seem that no fixed standard of reasonableness is possible, for the question must be determined under varying circumstances. What is just and reasonable under some circumstances may not be under others. From a carrier's standpoint, rates might fairly be deemed reasonable which from the shipper's point of view might be justly considered as immoderate. For instance, investors in railway property cannot be justly criticised for insisting upon a fair income upon the present worth of their investment, and for demanding commensurate rates, but should some of the articles of commerce produced in the territory served by their property be so depressed in price at their only market by reason of competition from other points of supply or otherwise that the rates charged or transportation to market would permit of no profit to the producer, than the latter properly ask a reduction of the charge, and it would be the duty of the carrier, under the general duty it owes to the public for privileges conferred, to accept a less compensation for its services even though its income would thereby be reduced below what would ordinarily be proper. Such conditions are ever present. An illustration is the low rates made necessary to move grain products from the interior to the eastern seaboard.

With a fair income upon the present worth of railroad property as a basis for earnings, the volume of traffic is a considerable factor in determining what is a reasonable charge. What would be reasonable in a thinly populated district with light commerce might be very unreasonable in densely populated states with large traffic. Opinions as to what should be considered the present worth of railroads are various. Perhaps as equitable an estimate as any is to take as the present worth what it would cost now to duplicate the property. Considered in that way it is evident that with a fair income as a basis for earnings, rates, even if unaffected by variations in the volume of traffic, must differ as the cost of the railroads differs. Upon a road constructed through a mountainous country, costing say \$100,000 per mile, rates could from no standpoint be considered reasonable which might be justly so considered upon a road in a smoother country costing but one-third as much.

The charge of unjust classification of articles of merchandise is frequently used as an attack upon the reasonableness of rates, reliance being made upon a comparison of the kind and value to show that the articles are not analogously grouped for the application of rates. Classification and rate making are interdependent. In the transportation of merchandise it has been found to be in the greatest degree impracticable to provide a rate for each of the thousands of commodities transported, hence arises the necessity of placing in classes articles as nearly similar in character and value as is possible. Various things are to be considered in selecting the class in which an article shall be placed, some of which are its weight, bulk, quality as to whether perishable or imperishable, volume, risk attending carriage, cost of transportation, value of service, direction of movement, etc., and here again no exactly equitable separation is possible; and arbitrary division is imperative. It seems reasonable that in classifying the greatest consideration should be given to the value of the service, and this will be proportionate to the value of the articles transported. Freight rates partake of the nature of taxes, and as taxes in general are measured by the value of the property taxed, there appears no good reason why rates should not be, as nearly as possible, similarly determined. Were classification abolished and all articles charged a like rate, one of two results would follow: Either the rate would be so high as to prevent the movement for long distances of articles of small value, or so low as to deny the carrier reasonable remuneration for its services. In either event the public would be injured, first, by an embargo being placed upon much of the commerce of the country, and second, by inefficient and perhaps dangerous service resulting from the financial embarrassment of the carrier.

One of the perplexities of the present transportation system is the diversity of its classifications. There are three general classifications in force. The "official," generally stated, controls in the territory east of the Mississippi river and north of the Ohio river; the "Southern Steamship and Railway" governs in the territory south of the Ohio and east of the Mississippi river, and the "Western" applies generally in the territory north and west of Chicago and west of the Mississippi river. These classifications apply interstate, and within their respective territories, locally in states which have no special classification. Many of the states have classifications of their own. Illinois has one, which makes four in opera-

tion in that state. Uniformity in classification has for years been advocated by journals giving special attention to railroad matters, by many railroad managers, by the annual conventions of railroad commissioners and by the Interstate Commerce Commission. That commission has recommended congress that it be given power to make a uniform classification, and it is not improbable that such legislation may be had at an early date, and if it should be much of the confusion now existing will doubtless be removed. This board believes that good results would follow such legislation, and therefore favors it.

Competitive rates seem reasonable or unreasonable according as they are viewed by different interests. To the carrier they appear reasonable, for did it not meet the cut rate of its competitor it would get none of the business at competing points. The communities benefitted by the low rates, of course, think them reasonable. On the other hand, non-competitive points consider such rates unreasonable, and that their commerce is unduly taxed for the benefit of competing points. To reconcile the conflicting interests of these numerous points arising under competition not legally regulated will strike the average person as something of a problem. It would be none too easy were competition entirely controlled by law. The lines of road between competing points sometimes vary considerably in length. The short line fixes the rate, and this rate is, if reasonable and made relatively equal at intermediate points along both roads, which compete for the trade of the same territory, and the rate must be so applied if all the points are to have what they would consider reasonable rates, will force the long road to perform practically without charge the service upon so much of its line as exceeds the length of its competitor. Against this result the long line will protest and seek, as a rule, to apply higher rates at intermediate points. Such action is often a cause of complaint that rates are unreasonable.

Competition in the introduction into the same market of articles of merchandise from two or more points of supply often produces rates which also are reasonable or unreasonable according as viewed by different interests. In Southern Nebraska and in Northern Kansas it is claimed that supplies of lumber from the north and from the south meet in competition. In order to introduce lumber into points in that territory from the south, carriers make a lower rate than that charged to intermediate points, and attempt to justify their action because they could deliver no lumber there if they charged a higher rate. The towns of Southern Kansas think it unreasonable that they should be charged a rate on lumber from the south higher than is charged at Omaha and other points in Nebraska upon lumber going there over the same lines in the same direction, and this board thinks so, too, but it is powerless under present conditions to remedy the grievance.

American Association of General Passenger and Ticket Agents.

Secretary A. J. Smith gives notice that the forty-first semi-annual meeting of this association will be held at Atlantic City, N. J., on September 15. The association will convene at 11 o'clock a. m. on the above date at the Casino, which is in close proximity to the following hotels, viz.: Shelburne, Dennis, Traymore, Windsor, Chalfonte, Hadson Hall, Seaside and Brighton, which will be prepared to take care of the entire party.

There are several important questions to be disposed of and it is believed that they will necessitate a three days session at least. First among these, in order and importance as well, will be a further report from the committee appointed at the Quebec meeting, September, 1894, to consider the question of controlling the issue of inter-line tickets.

This committee are Messrs. Atmore, Roberts, Flanders, Heafford, Thrall, McNicoll and Turk. The committee's desire has been that the question should be a pending one until an agreement could be assured, which should be at once permanent and effective; it is to be hoped that conclusive action will be reached at this meeting.

At the last meeting the chair was instructed to appoint a committee of five to recommend changes in the constitution and by-laws. This committee are Messrs. Martin, Daniels, Ford, Turk and Stone. This report will be of special importance to all members who have any desire to have the association continued.

The committee appointed to report some plan for uniform practice in cancelling inter-line tickets, consisting of Messrs. Buchanan, Delaney, and Kendall, are expected to make a final report.

The committee appointed to recommend a uniform method of action upon application for ticket representation, will have their report ready. The committee are Messrs. DeHaven, Lee and Fellows.

The question on uniform contracts of inter-line tickets was referred to by Messrs. Stone, Armstrong and Carrel, it is presumed that this committee will be able to report progress.

At the last meeting the following resolution was adopted. Resolved: That it is the sense of this association that the continued use of unlimited tickets, either local or inter-line, is prejudicial to the interest of railways here represented, and that we recommend to the different passenger associations throughout the territory that immediate steps be taken to have the same withdrawn, and that a committee consisting of one member of each association be appointed to further the adoption of this resolution by each association.

The chair appointed Mr. D. McNicol, of the New England Association, Mr. D. J. Roberts for the Trunk Line Association, Mr. C. S. Crane for the Central Passenger Association, Mr. C. P. Atmore for the Southern Associa-

tion, Mr. J. R. Buchanan of the Western Association, Mr. S. K. Hooper for the Trans-Continental Association.

In response to the circular issued by the secretary on July 18, 1896, the following topics for discussion have been received.

1. Have a term for each inter-line ticket.
2. Some plan to better control inter-line ticket representation.
3. Combination class ticket.
4. Standard contracts on tickets.
5. Lost tickets.
6. Recent ruling of the post office department with reference to the carriage of mail on passenger cars.
7. Closer relations.

All who intend to be present will best serve their comfort if they will notify Mr. J. R. Wood, general passenger agent of the Pennsylvania Railroad, Philadelphia, Pa., of just what hotel accommodations they desire, and if they are advised that any particular party are intending to be present, with whom they wish to be associated, and will give Mr. Wood the information, he will endeavor to locate them and their friends at some one of the hotels above named.

THE NEW PAGE DUMP CAR.

The accompanying illustrations give a general idea of the construction of a new side dump car which has been built by the Sheffield Car Co. for the Chicago, Lake Shore & Eastern Railway, and which has shown itself to be satisfactory in actual use. The Sheffield Car Co. built a car from the designs of Mr. C. D. Page, which was put into service upon the track elevation on the Chicago, Rock Island & Pacific Railway in Chicago in 1894. This car was fitted with six tipping boxes, which were so arranged as to unload upon both sides of the car. It was 34 ft. long and had a capacity of 66,000 lbs., and the boxes held 22½ cubic yards. After finishing the work upon the track elevation, this car was placed in the service of the Chicago, Lake Shore & Eastern Railway, where it was used for hauling stone, of which it fre-

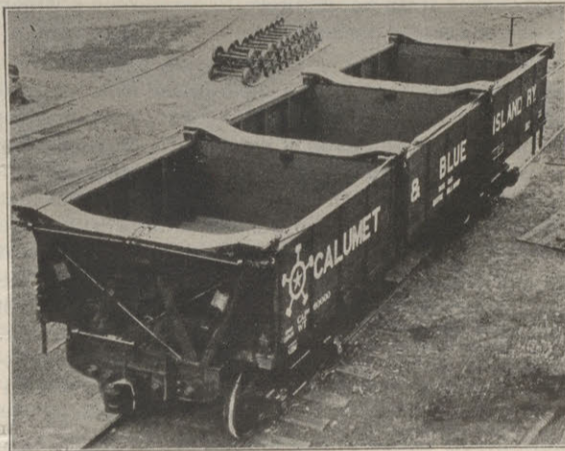


FIG. 1.—THE PAGE CENTER SILL DUMP CAR. This car is known as the side sill dump car, and upon a suggestion of Mr. W. G. Brimson, president of the railway referred to, the center-sill car was designed as shown here. The car was limited to 8 ft. 2 in. in height, and was required to carry 60,000 lbs. of coal, and to be able to deliver it all upon one side of the car. Simplicity of construction was also specified.

The car is 36 ft. long over end sills and 9 ft. 9 in. wide outside, and 9 ft. wide inside. The load is carried in three boxes, which are 4 ft. x 10 ft. 4 in. x 3 ft. 7 in. inside dimensions. The trucks are of the Michigan Central Railroad pattern, as used on low flat and furniture cars. The end sills are 16 in. deep,

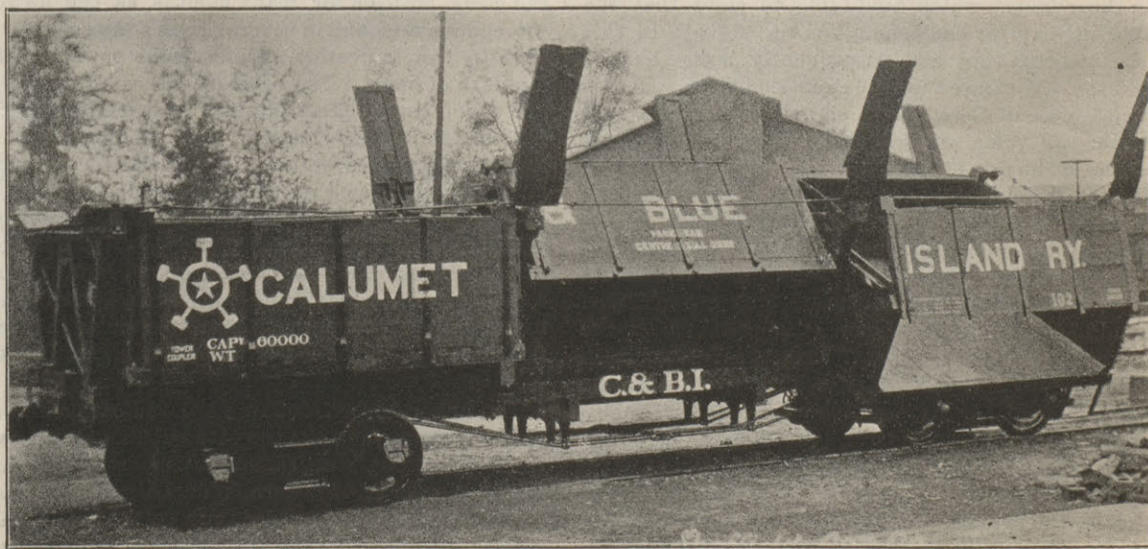


FIG. 2.—SHOWING POSITION OF BOXES IN DUMPING.

and the end view of the car shows that the draw-bar is passed through this timber. The longitudinal sills are placed close together, the center sill being the deepest and the others are shallower in order to admit of the tipping of the boxes without interference from these timbers. The center sill is covered upon the upper face by a steel plate, and upon this the weight of the boxes is brought by means of T irons, the flanges of which are bolted to the bottoms of the boxes. The web of the T rests upon the plate, and thus forms what amounts to a continuous hinge. There are two timbers across the sills between the end sills, and the sills are surmounted by trestles which are secured to the car by rods and serve to hold the boxes in position by latches at the corners, which secure the corners of the boxes to the trestles by four locks. The doors of the boxes are also secured by attachments to the same latches. Aprons or shields are provided, which are hinged to the trestles and prevent material from dropping between the ends of the boxes. These are shown in the illustrations.

When the car is used in construction work, the load is placed so as to bear heavier upon the side toward which it is to be dumped, and upon releasing the catches the dumping occurs. The doors are arranged to open wide enough to pass a five foot cube. A wheel is placed at the top corner of each end of the door, and this bears upon a track on the trestle and opens the door, as seen in the side view of the car. The following is taken from a printed description of the car:

This is believed to be the largest tipping box car ever built. It will readily hold 40 cubic yards, and has carried 64,000 lbs. of soft coal from the mines to the south works of the Illinois Steel Co., not then being loaded to its utmost limit.

The unique features of this car are: 1. Its pivotal construction. 2. The manner in which the boxes are locked. 3. The trestles at the box ends, rigidly secured to the fixed portion of the car, tied together at each end by the rods, formed to support and protect the box end while permitting its lateral motion. 4. The top of this trestle also affords a convenient standing room for the men operating the boxes (two men only being required, one at each end of the box). It also affords excellent facilities for leverage in tipping the boxes with a hook and pry. 5. The boxes can be tipped to either side of the car and the door is held up out of the way of the discharging material.

6. The construction is simple, the body construction not seriously departing from the ordinary, and permitting the use of a common type of truck and the ordinary draft rigging and air brake.

The advantages of a side dumping car over a center dump are supported by the statement that four times as much material can be unloaded from a side dump car without the use of shovels on a trestle 10 ft. high, as from a center dump.

Having a horizontal bottom and delivering the load on either side, this car is adapted to a greater variety of uses than dump cars in ordinary use. The load can be shoveled or dumped out at will, and the cars may be therefore used in construction work or in merchant service, as occasion demands.

TEREDO PROOF PILES.—The board of state harbor commissioners of California has under consideration a specially prepared pile that has successfully withstood teredo nearly ten years in San Francisco bay. The following specifications have been furnished the Engineering Record by Chief Engineer Howard C. Holmes of the board. Core to be 6 x 6 sized in every length of core. Care should be taken to make a square butt joint. Th

mainder of the pile to be built of 1 in. lumber, all sized to a uniform width and thickness. Each layer of boards after nailing should be well covered with coal tar and sand. All layers to be nailed with ten-penny nails to be driven in rows 2 ft. apart, with two nails in each row. Before putting on the outside layer of boards, a strip of ship felt shall be laid 4 ft. from the top of the pile, and extend to low water mark, well tacked. After putting on the outside board, the entire pile shall be nailed with 6 in. wire nails to be driven in rows 1 ft. apart, three nails in each row; after which two turns of hoop steel shall be made around the pile 6 in. below head of pile.

THE FUTURE OF POWER DEVELOPMENT.

The thoughtless or ignorant statements which frequently appear in the daily press upon the advent of new methods of propelling street and other cars in which the total eclipse and demise of the steam engine are chronicled have led Mr. George S. Strong, writing in Cassier's, to state the case of the steam engine plainly, and to consider in a general way the probabilities as to what the power development of the future will be. His opinion of the future of the gas engine is interesting and it is anything but conservative. After speaking of the limitations of wind and water power, and the advances which have been made by the introduction of steam to replace the sails in ship propulsion, he takes up the subject of steam, gas and heat engines in part as follows:

The steam engine has been man's best friend and will, doubtless, continue to hold its own for many years to come for many purposes, and to those who have given much thought to, and are thoroughly familiar with the situation, the many articles that have appeared in the daily press as to steam being superseded for driving long distance express trains, seem ridiculous. In the first place, there is not an electrical generating plant for power purposes to-day in operation that is generating a horse-power in regular work on two pounds of coal per horse-power per hour—not to say that a first-class steam engine cannot be made to do better when a full load is given at all times, but on a varying load the consumption of coal will be nearer four pounds than two. Then comes the loss due to transmission and conversion of electricity into power. The same may be said of compressed air, and in neither case will an average of more than 60 per cent. of the power of the original engine be delivered on the shaft of the secondary motor at the end of the wire or pipe.

The best compound locomotive, on the other hand, working steam from a modern wide fire-box boiler, or where a sufficient grate area is provided to enable the engine to steam freely with a large exhaust can be made to work down very close to, and, inside of, two pounds of good coal, and here the power is delivered directly to the axle and there are no losses except those incidental to all steam engines with unequal loads. The one great advantage claimed for the electric locomotive over the steam locomotive, was an even pull on the draw-bar, and an even pressure on the rail, but recent improvements in the locomotive have obviated this difficulty, and afford the possibility of a perfectly even pressure on the rail, and a perfectly even pull on the draw-bar, and the boiler so constructed as to burn all of the gases and do away with all the smoke and cinders, so that it would be as pleasant to ride behind such a locomotive as it would be behind an electric locomotive.

Considered from an economical standpoint, the cost of an electric locomotive of 1500 horse power would be about \$50,000; the generators to drive it would cost \$30,000 and the wiring of the track with an underground system would cost \$30,000 per mile. Assuming therefore, that we have 100 miles of road, and require four tracks to be wired, the wiring would cost \$12,000,000; 100 electric locomotives would cost \$5,000,000, the generators \$3,000,000, engines \$3,000,000 and boilers \$3,000,000, or a total of \$26,000,000, to handle modern fast express and freight trains over 100 miles of road, as against 100 balanced compound locomotives at \$12,000 each, or \$1,200,000 as compared with \$26,000,000.

If the electrical locomotives are furnished free coal, a railroad company could not afford to own them and pay the interest of \$1,320,000 per year on the investment, while if, each of the compound locomotives made an average of 400 miles a day for 365 days in the year, and used eight tons of coal at \$3 per ton, the coal would cost but \$876,000.

Assuming, as we may from the past experience, that electric power plants cannot be depended upon to produce better results in regular railroad work than they have done in street car service, we should have to expect to burn more than the same quantity of coal in the electrical plants than in the steam locomotives, so that we should have the \$1,320,000 plus at least \$876,000 or \$2,196,000 as the cost of interest and fuel for the electric plant and \$72,000 plus \$876,000 or \$948,000 as interest and cost of fuel for compound steam locomotives.

Taking gas engines, which derive their energy from coal or other carbon gases or from hydro-carbon gas, we open up a comparatively new field, for while the gas engine has been known and used for many years in a small way, and with remarkably good results as far as economy goes, it is only since a short time that its merits have been fully appreciated. It is now with the introduction of new methods of gas production, by the use of by-product saving appliances, that go far towards paying the original cost of the fuel, and thus reducing the cost of the fuel gas

to a very low figure, doing much to solve the problem of cheap and effective power.

As these gases are low in illuminating qualities, they are very much better suited to give the highest efficiency in the gas engine. Another gas that has recently been discovered has remarkable qualities under compression and can be reduced in volume 400 times at 800 lbs. and when expanded will burn with 20 times its volume of air, requiring only 0.4 of a pound of it when compressed to develop one horse power per hour. Each cubic foot of it at this pressure weighs, 30 lbs. and, therefore, contains 75 horse power hours, being the greatest storage of energy ever known for a given weight.

This opens a wonderful field for the development of power for motors for tram-cars and other classes of motor vehicles, as well as pleasure boats. Gas engines, working with this new fuel gas, are likely to have a very large use in all stationary work and for propelling boats, and it may not be beyond the bounds of possibility to drive ocean steamers and locomotives of the future by gas engines. It is especially suited to the generation of electricity, particularly when the electric plant is located at inaccessible points where it cannot be reached by boat or rail and where coal would have to be carted and from which ashes would have to be removed.

The gas producer can be located at the railroad or on the water front and a net very expensive pipe line run to the power plant, the gas traveling without cost except interest on the pipe line. The water for cooling the jackets of the gas engines can be used over and over again, and with proper arrangements for cooling the water, only a small quantity would be required, while the steam engine needs a large quantity for condensing.

A ton of soft coal will produce 125,000 cubic feet of gas of 160 heat units, about 45 feet of which will produce a horse-power in a properly designed and well-constructed gas engine, or about 2777 H.-P. hours for each 2240 pounds of coal. At the same time, about 90 to 100 pounds of sulphate of ammonia are recovered from this coal, which, at present, is worth about \$50 per ton, which, after paying all the cost of operating the producing plant and making the gas, yields about one cent per pound. The gas from blast furnaces can also be used and is found to give wonderfully good results, considering its poor quality.

Recent discoveries in mechanical power transmission have made it possible to run a gas engine at full speed in one direction and vary the speed of the driven shaft from zero to full speed in either direction without frictional gearing and without appreciable loss of power. This makes the gas engine applicable to any purpose to which the steam engine is suited and makes it especially suitable for boats, street cars and motor wagons.

Recent improvements in the construction of pumps have also made it possible for a pump to be run at the same speed as the piston of a gas engine, or from 600 to 1000 ft per minute and permit the direct connection of the connecting rods of the engine with the pump. This makes the gas engine, with such a pump, the most economical pumping engine yet devised, and while 135,000,000 foot pounds is about the limit of the steam pumping engine, the gas engine is likely to give over 200,000,000 duty.

Considerable has been said and written about the combination of the gas engine with electricity for driving trains, as against the steam locomotive. This involves the introduction of the losses by electrical transmission above mentioned, and the original cost of the electrical equipment, and does away with the advantage units of power, which has been the one cause of the return to the compressed air idea. It is altogether more probable that the gas engine will be used direct as a locomotive, commencing with the smaller motors for tram-cars and motor wagons, and gradually grow in favor as its utility is demonstrated, until the full fledged railway locomotive is developed, carrying its gas producer on a tender, entirely automatic in its operation.

The fireman, as such, will be done away with and become the engineer's assistant in oiling and looking after the operation of the machinery. This will bring the coal consumption per horse power per hour from about 5 down to about $\frac{1}{3}$ of a pound, and it will be done without adding greatly to the present first cost. For street car work, compressed gas with the gas engine makes it possible to run a car 750 miles with one charge and at a cost of less than one-third what it now costs to run the same car by electric motor, or one-third what it is likely to cost for the compressed air motor.

With the introduction of this gas motor applied to properly designed cars or coaches, the necessity for the track with its consequent blocking, owing to a single line of travel, disappears. With smooth pavements and rubber tires the track would not be required; and with independent busses or cars running without tracks, if any obstruction is met, it can be gone around and the journey continued without delay. The injury to the streets, owing to the laying of tracks that are a continual menace to ordinary vehicles, can too be avoided.

A TEST OF WATER TUBE BOILERS.

A report of two tests which were made by Mr. Thomas Pray, Jr., on Cahall vertical water tube boilers has been received from Messrs. H. E. Collins & Co., of Pittsburgh. These boilers were fitted with the Hawley down draft furnace and the result obtained, if correct, indicate that this boiler may well be termed a record-breaker, the result obtained being 13.9 pounds of water evaporated from and at 212 deg. per pound of combustible. The results were figured

upon the code of the American Society of Mechanical Engineers as given in Vol. VI. of the transactions. Some items were added by the conductor of the tests in conformity with his usual practice as being slightly more explanatory. The tests are described by Mr. Pray as follows:

The water was measured in two barrels, each having a separate outlet and each having a separate overflow to which point they were filled each and every time. Tally was kept by a man stationed within 20 feet of the barrels where he could observe the drip of both outlet cocks, and these barrels were carefully weighed when precisely level by myself and were leveled in their final position, and were examined during the test. Less than the amount called for by the weight could not be counted as a barrel and more could not be had on account of the overflow. One man filled the barrels, and another man emptied them, levers were put upon the cocks so that the man keeping tally could tell without moving, which valve was closed, and when they were open, and when they were closed. The drippipe was in plain sight of the tally keeper, and no possible motive existed for any person to insinuate any uncertainties, as both the owners of the boiler, and the builders were represented continually.

The pressure gage upon the boiler was not correct, for the column of water which was upon it, so that a double correction is made in the report. A test gage was placed on the boiler at the very top, very shortly after the first run was begun and the error of the water column amounted to 12.592 lbs. per square inch. The barometer reading was furnished by the United States signal service observer in Pittsburgh, the average of each day. The force of the draft was read by a fine draft gage drilled from the inside into one of the peep hole doors in the rear of the boiler. The temperature was observed by standard thermometers, except that of the escaping gases which were read from a pyrometer corrected and twice tested in hot mercury with a standardized thermometer of about the temperature at which it would be read.

The coal burned was known as the Summer Hill mines slack, said to cost \$.95 for 2200 lbs. on the car in the yard of the owners of the boiler. The moisture in the coal was made from an average of the whole days sampling, as was the sample for the chemical analysis from each day's run. The test was commenced at 8 o'clock a. m. and run until 5 p. m., with no noon hour.

Exceedingly little smoke was perceptible at any time of the day. The average temperature of the escaping gases was 403.05 deg. F. ranging from 360 deg. to 450 deg. F.: the changes were not abrupt and the boiler proved itself to be exceedingly sensitive to the handling of the fire.

For about three hours of the day there seemed to be a cross current of air in the valley where the boiler is located, and the fire really sluggish, the upper doors being open, the smoke in clearing from the furnace showed some extraordinary features and on this test I had the coal run over a fine screen (of about $\frac{1}{4}$ in. mesh) set up sharp in order to get the dirt out of the coal; outside of the waste given, 208 lbs. of fine dirt was taken from the coal.

The total loss from the fires was 19.827 per cent and burning 777.14 lbs. of coal per hour, the ash and cinders amounted to 1,271.5 lbs.; and it is quite safe to say that there was not 50 lbs. of ashes in the whole amount of refuse. The intention was to make the fire at the close fully equal to what it was in the morning without regard to the coal account.

The evaporation is high, the quality of the steam shows a superheat of 40 deg. F. equivalent to an addition to the performance of the boiler of 2.184 per cent, and this I consider far within the capacity of the boiler; for the boiler did not have an average opportunity by reason of the atmospheric conditions, it being Monday, and rather a lack of care on the part of the fireman. During the day a number of calorimeter tests were made by the barrel calorimeter, and these results checked very closely the results of the Carpenter's throttling calorimeter, the barrel showing superheat as well as the Carpenter's portable calorimeter.

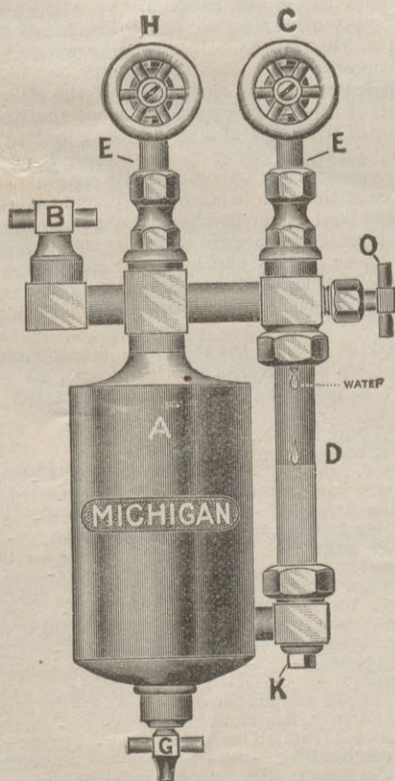
The record of one of the tests which was made at the Armstrong Cork Co.'s works at Pittsburgh, as given by Mr. Perry, is presented, somewhat abbreviated, as follows:

Date of trial	May 4, 1896.
Duration	8 a. m. to 5 p. m., 9 hours.
Grate surface, 7x5 ft	- - - - - 35. sq ft
Water heating surface	- - - - - 2,494 sq ft
Superheating surface	- - - - - 140 sq ft
Ratio of water heating to one of grate surface	- - - - - 71.25
Pressure by gage	- - - - - 96.39 lbs
Force of draft in inches of water	- - - - - 6 in
Escaping gases, temperature	- - - - - 403.05 deg F
Feed water, temperature	- - - - - 68 deg F
Percentage of moisture in the coal	- - - - - 2.0134 per cent
Pounds of moisture in the coal	- - - - - 143.72 lbs
Dry coal in pounds	- - - - - 6,994.28 lbs
Ash and cinders	- - - - - 1,271.5 lbs
Percentage of ash and cinders	- - - - - 18.18 per cent
Pounds of moisture, ash and cinders	- - - - - 1,415.22 lbs
Total loss in coal from all causes	- - - - - 19.827 per cent
Pounds of combustible	- - - - - 5,722.78 lbs
Quality of the steam (dry steam being taken as unity)	- - - - - 1.02184
Number of degrees superheat	- - - - - 40.238 deg F
Percentage of superheat	- - - - - 2.184 per cent
Total quantity of water pumped into the boiler and apparently evaporated	- - - - - 65,949 lbs
Water actually evaporated, corrected for quality of steam	- - - - - 67,388 lbs
Equivalent water evaporated into dry steam at and from 212 deg. F	- - - - - 79,936 lbs
Factor of evaporation	- - - - - 1.1862 lbs
Equivalent B. T. U. from the fuel	- - - - - 77,194,000 B.T.U.
Equivalent water evaporated into dry steam at	- - - - -

and from 212 deg. F. per hour	8,881.8 lbs
Water actually evaporated per pound of dry coal, from actual pressure and temperature	9.6347 lbs
Equivalent water evaporated per pound of dry coal at and from 212 deg. F.	11.429 lbs
Equivalent water evaporated per pound combustible at and from 212 deg. F.	13.968 lbs
Equivalent water evaporated per pound of dry coal, with one-sixth refuse, at 70 lbs. gage pressure from temperature of 100 deg. F.	10.126 lbs
Dry coal actually burned per square foot of grate surface each hour	22.204 lbs
Water evaporated at and from 212 deg. F. per square foot of heating surface each hour	3.8159 lbs
Water evaporated at and from 212 deg. F. per square foot of grate surface each hour	253.76 lbs
Horse power of boiler per American Society of Mechanical Engineers' code	257.55 H P
Horse power of boiler (builder's rating) 10 sq. ft. per horse power	250. H P
Horse power in excess of maker's rating in the performance of the boiler	3.02 per cent
Square feet of heating surface for one horse power	9.0374
Square feet of grate surface for one horse power	1.359
Heat units accounted for in the water for one lb. of dry coal	11,037 B. T. U.
Heat units in one pound of coal by the "Bomb Calorimeter"	12,854 B. T. U.
Efficiency of boiler performance in percentage of the theoretical value of the coal as above	85.862 per cent
Cost of coal per ton (2,000 lbs.)	95 cents
Possible evaporation for one pound of coal, actual conditions	11.2214 lbs
Actual evaporation under working conditions.	9.6347 lbs
Percentage of possible evaporation realized under actual conditions	85.862 pr. ct
Heat units in one ton of coal	25,708,000 B.T.U.
Heat units required to make one ton of water into steam, actual conditions	2,291,000 B.T.U.
Possible tons of water into steam with a ton of dry coal	11.2214 tons
Cost of 2,000 lbs. of water into steam, actual conditions	8.4661 cts
Pounds of water into steam for one cent, actual conditions	236.24 lbs
Horse powers of 34.488 lbs. of water per hour at and from 212 deg. F., A. S. M. E. code or its equivalent, 30 lbs., from 100 deg. F., to 70 lbs. steam gage pressure for one cent	6.8503 h. p.
Cost of one horse power of steam one hour in fractions of a cent	146
Heat units for one cent	270,620 B.T.U.
Theoretical loss of possible heat units, all sources	14.138 pr. ct.

A NEW KEROSENE OIL BOILER FEEDER.

The accompanying illustration shows an external view of the Michigan Lubricator Company's new kerosene oil boiler feeder, patented July 21, 1896, by Mr. Geo. C. Morris, secretary and treasurer of the company, which is placing them on the market. The device is intended in application to straddle the check valve with the feed water pipe, thereby obtaining a forced circulation through the feeder, with a consequent positive action. The engraving



is lettered for convenience of explanation. A connection of the water pipe of the boiler on the pump or injector is shown at C and H is a connection for the water pipe upon the boiler side of the check valve. EE are unions for detaching the oil feeder and B is a filler plug. A feed regulating valve is provided at O and G is a drain valve. D is a combined sight feed and gage glass and K is a plug through which a new glass may be inserted or the glass which is in the instrument may be cleaned

through this opening. The oil reservoir is marked A.

This machine has but one glass, the sight feed glass, which performs the double function of showing the feed and registering the amount of oil in the reservoir simultaneously. This is accomplished by having what is termed a "down feed," instead of an "up feed," that is, when the reservoir is filled with kerosene the sight feed glass simultaneously fills. The "sight" is formed by water dropping through the oil in the glass, a volume of oil being ejected from the machine into the boiler of precisely the same volume as the drop of water admitted; the water settles to the bottom of the reservoir, raising the oil to the top, the same effect taking place in the sight feed glass. The separation line of oil and water is continually rising in the sight feed glass equal to its rise in the oil reservoir. Consequently, when all the oil is out of the sight feed the reservoir is empty, but the glass registers the incoming drop of water as long as there is a particle of oil left in the reservoir.

As the exposed portion of this combined sight feed and gage glass is equal to the entire internal height of the oil reservoir, it does not cease its function of registration at a time when it is most needed, as do some machines in which the upper packing nut of the gage glass extends an inch or two below the highest oil level. The action of the sight feed glass is much more interesting than what is known as the "up drop," a drop of water through the oil in the glass presents a silver tinted edge owing to its rotundity, and is even more clearly defined than a drop of oil rising through water. The separation line between the oil and water in this combined sight feed and gage glass is said to be much more clearly defined than in other machines provided with a gage glass, because each drop of water descending through the kerosene agitates this separation line at its joints the body of water underneath, thus causing a continual reflection of light at the division line.

The Michigan Lubricator Company manufactures several styles of up drop oil boiler feeders, and also a machine specially adapted to feed a new boiler oil now being introduced into the market, which is the highest fire test than kerosene and considerable greater specific gravity. The up drop feeders will also be constructed in outline to conform to the convenience of locomotive use. The address of the company is Detroit, Michigan.

OUR PATENT RECORD.

(Our record of patents that most interest our readers is compiled regularly by our Washington correspondent with the idea of being a complete index. Space forbids more than the citing of a reference, but the complete specification or drawing of any patent desired will be mailed to any address upon receipt of 10 cents in stamps, and other information in regard to patents will be cheerfully given. Address all communications to our correspondent, Edw. C. Weaver, Attorney and Counselor, McGill Building, Washington, D. C.)

- 565,894, railway switch, Frederick-Greewald, New York, N. Y., filed Mar. 9, 1896. Serial No. 582,327, (no model).
- 565,895, rail joint, James M. Halfpenny, Swengel, Pa., assignor of one-half to Wm. E. Smith, Millmont, Pa. filed June 18, 1896. Serial No. 596,062, (no model).
- 565,899, switch stand, Moses G. Hubbard, Jr., Chicago, Ill., assignor to the McGuire Mfg. Co., same place. Filed June 18, 1896. Serial No. 553,085 (no model).
- 565,921, railway switch, Moses S. Pittman, Independence, Mo., filed Feb. 24, 1896. Serial No. 580,604 (no model).
- 565,929, automatic pneumatic railway gate, Chas. H. Sherwood, Utica, N. Y., assignor of one-half to Henry C. Lyman, Sherburne, N. Y., filed Aug. 12, 1895. Serial No. 559,017 (no model).
- 565,934, car coupling, George E. Smith, Shiloh, La., filed June 30, 1896. Serial number 597,602 (no model).
- 565,977, car coupling, Simeon Grenier, St. Cesaire, Canada, filed March 19, 1896. Serial No. 583, 914 (no model).
- 565,998, railway frog, Geo. E. Lucas, Cleveland, O., filed May 6, 1896. Serial No. 590,474.
- 566,018, car buffer, Willard F. Richards, Buffalo, N. Y., assignor to the Gould Coupler Co., New York, N. Y., filed April 27, 1896. Serial No. 589,283, (no model).
- 566,047, car axle box lid, Henry C. Williamson, Michigan City, Ind., and Chas. A. Schroyer, Chicago, Ill., filed Oct. 22, 1895. Serial No. 556,573 (no model).
- 566,056, car coupling, Harry C. Buhoup, Chicago, Ill., assignor to the McConway & Torley Co., Pittsburgh, Pa., filed Jan. 25, 1896. Serial No. 576,766 (no model).
- 566,127, railway car, Albert Bierstadt, New York, N. Y., filed May 13, 1896. Serial No. 591,394 (no model).
- 566,281, railway switch, Marcel Tremblay, Springfield, Mass., assignor of one-half to Pierre Lussier, Jr., same place, filed April 27, 1896. Serial No. 589,153 (no model).

TECHNICAL MEETINGS.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its in-

formal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the fourth Wednesday of January, March, April, September and October, at 10 a. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading and discussion of papers on the first Wednesday of each month except January.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West thirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumberland Publishing House, Nashville, Tenn.

Annual meeting Traveling Engineers' Association, Minneapolis, Minn., Sep. 8, 1896. W. O. Thompson, secretary 415 Marion street, Elkhart, Ind.

PERSONAL.

Mr. G. G. Lynch has been appointed assistant superintendent of transportation of the Atlantic Coast Line, with office at Florence, S. C.

The title of Mr. Henry L. Shute, heretofore general traffic manager of the Great Northern, has been changed to that of traffic manager.

A. Ziehl, master mechanic of the Prussian Royal Railway Co., was in this city recently on a tour of inspection of American railway systems.

Mr. T. L. Stewart, formerly master of trains of the Plant System, with office at High Springs, Fla., has been transferred to Gainesville, Fla.

Mr. D. C. Moon has been appointed general superintendent of the Dunkirk, Allegheny Valley & Pittsburgh, vice Mr. C. H. Ketchum, resigned.

Mr. Joseph Drinker, who since January 1892 has held the position of assistant general freight agent of the Rio Grade Western, has resigned.

Mr. Abner White, who has been master carpenter of the Susquehanna division of the Erie thirty-four years, died at Elmira, N. Y. on Thursday, August 13.

Mr. William Rutherford, who has held the position of superintendent of motive power and equipment of the Plant System for about two years, has resigned.

Mr. Edward Shamp has been appointed general superintendent of the Maricopa & Phoenix Railroad, with office at Phoenix, Ariz. He succeeds Mr. C. S. Masten.

Mr. S. R. Tuggle, superintendent of motive power of the Houston & Texas Central, has also been appointed to the same position on the Galveston, La Porte & Houston.

Mr. A. S. Dunham, late general manager of the Ohio Southern, has been appointed special master in the Baltimore & Ohio receivership by Judge Goff of the federal court at Baltimore.

Mr. J. C. McKenzie, trainmaster of the Georgia & Alabama, with office at Americus, Ga., having resigned, the office has been filled by the appointment of Mr. E. E. Anderson to that position.

Mr. Joseph McWilliams formerly general superintendent of the Texas Central has been appointed superintendent of the Marietta & North Georgia, with headquarters at Marietta, Ga.

The position of car accountant of the Chester & Lenoir Railroad made vacant by the resignation of Mr. J. E. Dean, has been filled by the appointment of Mr. L. H. Coy, with office at Sparta, Ill.

Mr. H. P. Eagar has been appointed manager of the Chattanooga, (Tenn.) Car Service Association. Mr

Eagar was formerly general freight and passenger agent of the Chattanooga Southern.

Mr. Edward Fells has been appointed division freight agent of the American Refrigerator Transit Company at Houston, Tex., to succeed Mr. D. C. Weatherby, who has resigned to engage in other business.

Mr. J. H. Haas, who for three years past has been chief clerk in the office of Benjamin McKeen, superintendent of the Peoria division of the Vandalia, has been appointed trainmaster of the Ohio Southern.

Mr. James Donahue, formerly general freight and passenger agent of the Kansas City, Pittsburg & Gulf has been appointed vice president and general manager of the recently reorganized Missouri Central Railroad.

Mr. William Sinnott has been appointed master mechanic of the second and third divisions of the Baltimore & Ohio Railroad with headquarters at Cumberland, Md. Mr. Sinnott was formerly general foreman of the shops at Philadelphia, Pa.

Mr. F. O. Becker has been appointed assistant general freight agent of the International & Great Northern, with headquarters at Galveston, Texas. Mr. Becker was formerly general freight and passenger agent of the Galveston, Houston & Henderson.

Mr. W. G. Burrell, has been appointed stationery agent of the Grand Trunk Railway System, with headquarters at Montreal, Can. Mr. J. W. Newshaw, has been appointed assistant stationery agent, with headquarters at Detroit, Mich.

Mr. W. H. Gemmell, who for some time has held the position of chief clerk to General Manager Burt of the Chicago, St. Paul, Minneapolis & Omaha has been appointed chief clerk and private secretary to President Winter of the Northern Pacific.

The position of master mechanic of the St. Louis Southwestern Railway of Texas, and the Tyler Southeastern Railroad, made vacant by the death of Mr. Thomas Ingalls, has been filled by the appointment of Mr. J. M. Scrogin to that office, with headquarters at Tyler, Tex.

Mr. J. R. Wentworth, who for some time has held the position of general superintendent of the St. Louis & San Francisco, has been appointed superintendent of transportation, and will have entire charge of the transportation department. The office of general superintendent has been abolished.

Mr. Frederick Harrison, general manager, and Robert Turnbull, general superintendent, of the London & North-western Railway of England, are expected to arrive in New York by the Cunard line steamer Lucania, on August 22, and it is said they will make a tour of the country inspecting American methods of operating railroads.

Mr. William Whyte, for several years superintendent of the Texas Trunk Railroad has been appointed receiver of the property by Mr. A. P. McCormick, United States, circuit court judge. The appointment will take effect September 1. Mr. Whyte will succeed Mr. George T. Atkins, who was placed in charge of the road three years ago.

On September 1 a change will take place in the purchasing department of the St. Louis & San Francisco Railroad. Mr. E. T. Smith, who was assistant to the former general manager, Mr. H. F. Morrill, and also purchasing agent, has resigned and the office will be abolished. After the date above mentioned the purchasing will be looked after in General Manager B. F. Yoakum's office.

It is announced, though not officially, that Mr. A. R. Raymer assistant division engineer of the Michigan Southern Division of the Lake Shore & Michigan Southern Railway is to take the position of Assistant Engineer of the Pittsburgh & Lake Erie Railroad, and that Mr. E. D. Wileman is to be promoted from the position of signal inspector to succeed Mr. Raymer, with headquarters in Toledo.

In a recent circular General Manager Sands of the Norfolk & Western announces that the position of general superintendent made vacant by the death of Mr. A. C. Hippy has been abolished. Mr. R. P. C. Sanderson, division superintendent of motive power of the road, has resigned, and that position has been abolished. The position of division engineer of maintenance of way has also been abolished. The latter was held by Mr. J. B. Fuller. The duties of the two latter positions will be assumed by the superintendent of motive power and the engineer of maintenance of way respectively.

President Robinson, of the St. Louis & San Francisco Railroad Co., has begun the reorganization of the operating staff. The office of general superintendent will be abolished and also the division superintendent's office at Fort Smith. The St. Louis & Texas divisions, including the Salem branch, will be consolidated under the division superintendent's office at Springfield, Mo. J. R. Wentworth is appointed superintendent of transportation in charge of the entire transportation department, J. A. Mantor, Springfield, Mo., is made division superintendent of the St. Louis division and A. O'Hara, Neodosha, Kas., of the Kansas division.

The following appointments are announced in the engineering department of the Grand Trunk System. Mr. William McNab, assistant engineer, in charge of the engineering and drawing office at Montreal; Mr. Robert Armour, assistant engineer eastern division, office at Montreal; Mr. W. P. Chapman, assistant engineer, northern division, office at Allandale. Mr. H. B. Hollinshead, assistant engineer, middle division, office at London; Mr. George Masson, assistant engineer, office at Detroit. Assistant engineer in control of divisions will have

special charge of the maintenance of the road-beds, culverts, track and buildings, including machine shops, running sheds, and water stations on their respective divisions.

RAILWAY NEWS.

Columbus, Hocking Valley & Toledo.—The stockholders of the company will at a meeting to be held on Sept. 8, vote on a proposition to issue \$30,000,000 of four per cent gold bonds, due on July 1, 1896. Of this amount \$22,000,000 are to be reserved for the payment of bonds issued or to be issued under existing mortgages on the property of the company. Two and one-half millions will be exchanged for the issue of \$1,475,000 Ohio Land & Railway Co. purchase money mortgage 20-year 6 per cent gold bonds. For the exchange of \$300,000 of Welleston & Jackson Belt R. Co. first mortgage 6 per cent gold bonds of \$1,000 each, at the rate of \$1,400 for the new bonds will be issued. About \$5,500,000 will be used for improvements, additions and enlargement.

Dallas Terminal Railway & Union Depot Co.—The property of this company is advertised to be sold by the sheriff to the highest bidder on the first day of September. The property consists of five miles of track of the Terminal Railroad and the franchises pertaining thereto. The sale is under two executions, issued, one a judgment in the court of civil appeals, in favor of Mitch Gray; and the other on a judgment in the Forty-fourth judicial district, in favor of E. M. Blazer.

Des Moines & Kansas City.—Preparations are about completed for the widening of this road to standard gage, between Des Moines and Van Wert, Ia. This road is operated by the Keokuk & Western, a standard gage line, running from Keokuk to Van Wert.

Green Bay & Western.—This road, formerly the Green Bay, Winona & St. Paul, is making extensive improvements along its line. It is stated that 47 miles of new rail will be laid between Hixton and Marshland, and this will put the entire line in first class condition.

Muscogee, Oklahoma & Western.—The stockholders of this proposed line have elected officers as follows: P. J. Byrne, president; L. Morphis, first vice president; G. W. Sutton, treasurer; B. W. Morphis, secretary and attorney. Board of directors: J. S. Stapler, Talequah; C. W. Turner, P. J. Byrne, P. Porter, A. W. Robb, Muscogee; G. W. Sutton, W. H. Herbert, R. W. Dunlap, J. L. Morphis, Cleveland; C. E. Vandevort, F. M. Thompson, B. W. Morphis, Pawnee. Executive board: H. J. Byrne, C. W. Turner, P. Porter and W. H. Herbert. As soon as the right of way bills pass congress and the Creek council, the work of construction will begin.

Midland Terminal.—Denver press dispatches state that Judge Caldwell of the United States circuit court has made an order upon application of the Midland Terminal R. Co. whose line is the connecting link between the Colorado Midland R. and Cripple Creek, directing Receiver Ristine of the Colorado Midland to resume traffic relations with the Terminal at once on the basis that obtained before the rupture occurred. With the assistance of a railway expert Judge Caldwell proposes to investigate the matter in dispute.

Peoria & Pekin Union.—This road on August 18 opened for business the new double track between Wesley Junction and the Peoria & Eastern track. The new track is eight miles long. Hereafter the annoyance of holding trains on sidings between the P. & E. junction and Pekin to allow other trains to pass trains coming in an opposite direction will be done away with and it will enable the roads to shorten their time several minutes in getting entrance into and getting out of Peoria. The Peoria & Pekin Union is operated under a perfect block system.

NEW ROADS AND PROJECTS.

Arkansas.—The surveys for the Hoxie, Pocahontas & Northern R., to run between Hoxie and Pocahontas, a distance of 15 miles, have been completed, and the line graded for about three miles. It is intended to have the road in operation by Oct. 16. N. S. Woods, Hoxie, Ark., is chief engineer.

California.—Active construction work on the San Francisco & San Joaquin Valley R. is to be stopped as soon as soon as the road is completed to Fresno, Cal., and the directors have decided to do no more construction work until they can place bonds on the market.

Canada.—It is reported that the Nova Scotia Southern R. expects to lay a portion of the track this year between Shelburne and New Germany, N. S., 76½ miles, and between Indian Gardens and Liverpool, 19½ miles. Mr. Robt. G. Harvey 80 Broadway, New York City, is president.

The St. Catharines & Niagara Central R. will apply to parliament for authority to extend its line so as to connect with the Toronto, Hamilton & Buffalo at some point east of Smithville, Ont.

The Vancouver Victoria & Eastern Railway & Navigation Co. is seeking a charter from the Dominion government for the construction of a railway from Vancouver, B. C., via South Vancouver, Richmond, Delta, Surrey, Langley, Matsqui, Sumas and Chilliwack, thence across the first mountain range by a pass lately discovered, thence across Nicola valley, Okanagan valley, through the Boundary Creek and Kettle River country, into the great mining district of Kootenay; with power to extend across the continent to some point on the Atlantic seaboard, with branches to New Westminster, Victoria and Nanaimo. It is proposed to begin surveys at once, J. H. Brownlee, Van-

couver, B. C., is engineer and Norman McLane is secretary. It is said that a party of surveyors have started out to locate the line.

Indiana.—It is reported that the old project of the Cincinnati, Union City & Chicago R., which was abandoned some time ago, has been revived, and that Chicago capitalists have interested themselves in it. Judge N. W. Bliss, and F. W. Short are said to be among those interested. Considerable money has been expended on this project, and some 20 miles of the roadbed graded between Union City and Huntington, Ind.

Kentucky.—It is reported that the Brooksville R., extending from Brooksville to Wellsburg, Ky., 10 miles, will build an extension 27 miles long, from Wellsburg to Mt. Olivet, Ky. Mr. Y. Alexander, Brooksville, Ky., is president.

Maine.—The Portland & Rumford Falls R. is building an extension from its main line at Gilbertville, Me., to Chisholm's Mills. Six miles of the extension are now under contract by McGregor Bros., Rumford Falls, who have about one-third of the work completed, and one mile of track laid. Four miles additional of the extension will soon be put under contract.

Maryland.—The York Southern R. has under survey an extension from Pennsylvania state line to Bel Air, Md. The road also proposes to build a branch 2½ miles long, from the main line to Dallastown, Pa.

Massachusetts.—It is reported that contracts are to be let at an early date for the construction of the Chester & Becket R., extending between the two towns of Chester and Becket, Mass., a distance of 5¼ miles. It is stated that the line is to be equipped and operated by the Boston & Albany R. Mr. James A. Rumrill, Springfield, Mass., president, and J. B. Haviland, Boston, Mass., chief engineer.

Montana.—It is reported that the grading on the Montana R. has been completed from Helena to Castle, Mont., and that tracklaying will proceed at once. The line is expected to be ready for operation by October 1.

North Carolina.—It is reported that the Moore County R. is to be extended to Concord, N. C., and that a company is being formed for that purpose. The Moore County R. at present has a line 13 miles long extending from Aberdeen west. W. B. Eckhout, Aberdeen, N. C., is general manager of the Moore County R.

Oklahoma.—The Canadian Coal & Railway Co. has been incorporated in Oklahoma to build a railway from Muscogee, I. T., to Fort Smith, Ark., via Webbers Falls, Tahama and Oak Lodge. Capital stock, \$500,000. Officers and directors: John I. Brayer of Tahama, I. T., president; W. G. Garland of Tahama, vice president; Joseph S. Forrest of Tahama, treasurer; J. T. Perriman of Morrison, Okla., secretary; R. C. Boles of Perry, Okla., assistant secretary; A. H. Boles of Perry, general attorney; Green McCurtin and Robert J. Ward of Oaklodge, I. T. The headquarters of the company will be at Perry, Okla.

The St. Louis, Oklahoma & Gulf has been incorporated in Oklahoma to build a railroad 250 miles long from Sapulpa, I. T., to Henrietta, Texas, passing through the Creek and Seminole nations into Pottawatomie and Cleveland counties, Oklahoma, and thence through the coal and asphalt regions of the Chickasaw country. Capital stock, \$1,000,000. Incorporators: E. C. Nickels, S. Clay, E. R. Mundy, H. Arrington, S. P. Marsh and others. The headquarters of the company are to be at Tecumseh, Okla.

South Carolina.—It is reported that the surveys have been completed for the first section of the Charleston & Macon R., from Charleston to Allendale, S. C., and that active work will be commenced about September 1, on the construction of the road. At Allendale connection will be made with the Greenwood, Anderson & Western R., which is also under construction.

Mr. John K. Garnett, of Garnett, S. C., is promoting the building of a railroad some 23 miles long from Savannah, Ga., to Foot Point, S. C. It is said that he and others have purchased some 7,000 acres of land on what is called Colleton Neck, adjoining Bluffton, S. C., and that wharves, warehouses, etc., will be built at Foot Point.

Tennessee.—A Knoxville, Tenn., dispatch says that contracts are soon to be let for the building of the Ohio River, Knoxville & Tidewater R. The contract to be first let will be on the main line from Jellico to Knoxville via Big Creek Gap. A contract for the belt line and the portion of the main line from Knoxville to the North Carolina line will also be let at the same time, as will also the contract for the branch of the belt line to Sevierville. Martin L. Ross is president and John Bane secretary.

Texas.—Work is now in progress on the Ft. Worth Stock Yards Belt R., and it is thought that the line will be in operation by October 1, as the grading is completed and the ties already on the ground. On August 8, the following officers of the company were elected: G. W. Simpson, Boston, president; L. V. Niles, Boston, first vice president; W. E. Skinner, Ft. Worth, second vice president; A. G. Crosby, Boston, treasurer; N. P. R. Hatch, Chicago, secretary.

The citizens of Italy, Ellis county, Texas, have accepted the proposition made to them by President E. H. R. Green for an extension of the Texas Midland to that point. The extension will run from Ennis to Italy, a distance of 20 miles, and the citizens of the latter town agree to furnish the necessary ground for the depot, etc., and also the right of way for the entire distance.

Work on the Paris extension of this road is rapidly nearing completion and it is expected to have it opened for traffic before October 1.

Virginia.—The Portland Belt R. has again put surveyors in the field to locate a belt line in the city of Portsmouth, Va., to connect the five railroad and three water lines which reach the city.

Washington.—Work is now in progress between Northport and Roseland, Wash., on the grading of the extension which the Spokane Falls & Northern is building to the mines in Southern British Columbia.

Wisconsin.—The Rhinelander & St. Paul R. Co. filed articles of incorporation in the office of the secretary of state of Wisconsin on Aug. 14. Its road is to be about 20 miles in length, from Rhinelander in Oneida county, to Camp Josie station on the Chicago, Milwaukee & St. Paul R., and it is to maintain and operate the railroad already constructed from Camp Josie station to Casnovia Junction. The capital stock of the company is \$20,000 of common stock. The incorporators, who are also directors, are Chas. A. Goodyear, Fannie A. Goodyear, Sid. C. Eastman, Chicago; and Alva S. Goodyear and Adam Gabe, Tomah, Wis.

INDUSTRIAL NOTES.

Cars and Locomotives.

—An order has been placed by the Cumberland Valley, at its Chambersburg shops, for two new coaches—one a combined passenger and baggage coach and the other a combined mail and baggage car. They are to be of the Pennsylvania type.

—The Dickson Manufacturing Company, at Scranton, Penn., has just completed a passenger locomotive arranged for burning anthracite culm. This is the first engine ever built to use culm as fuel, and was built for the Lackawanna road.

—Two of the new Carnegie all-steel cars illustrated in our issue of June 13 are now in regular use on the Erie & Pittsburgh Railroad.

—The contract for furnishing compressed air motors for the Eckington & Soldiers' Home street railway of Washington has been awarded to H. K. Porter & Son, of Pittsburgh, Pa. The contract calls for 10 motor cars, which will be ready for shipment early in September.

—The St. Charles Car Co. has received an order for 20 furniture cars from the Union Pacific, Denver & Gulf Railway.

—The Chicago City Railway Co. has let contracts for 210 street cars to replace those burned at the recent burning of its car barns. The Wells-French Co. will build 140 of this order and the Pullman Co. 70.

—The United States Car Company has taken contracts for six tank cars, 60,000 lbs. capacity, for the Seaboard Iron Works & Supply Company, and two dump cars, 40,000 lbs. capacity, for the Marsh Mining company, to be built at the Anniston works. The tanks are to be equipped with air brakes and M. C. B. couplers.

—The Michigan-Peninsular and the Wells-French companies have both commenced work on the Lake Shore cars, mention of which contracts has previously been made in this column.

Within the past few weeks H. K. Porter & Co., the locomotive builders of Pittsburgh, have received orders for engines from foreign companies amounting to between \$30,000 and \$40,000. One of these engines is for a Russian railroad near St. Petersburg. The suburban traffic has been very heavy and German engines have been used. These have been unsatisfactory, and the Pittsburgh concern was sought as an experiment. The engine will have a gage of but 29½ inches, but will be a modern model. A standard locomotive has also been ordered for San Salvador, Central America, and one is being built to haul asphalt at Trinidad in the West Indies. A 30-gage engine is being built for a tramway at Port au Prince, Hayti, and two 40-ton locomotives are being constructed for use in the gold mines in South Africa, near Johannesburg. An experimental engine will also be built for use in Tiflis, in the Caucasus Mountains.

Bridges.

—The county commissioners are considering the question of erecting four new bridges in Youngstown, O. An election will probably be held to vote on the question.

—Plans and estimates for a new bridge on Jackson street, in Waukegan, Wis., have been accepted and the city clerk authorized to advertise for bids.

—Sealed bids will be received until August 27 for constructing a covered Howe truss bridge across Saluda river at Newbury, S. C. Plans and specifications now on file.

—At Green Bay, Wis., the council has decided to construct a wider and stronger bridge in place of the Main street bridge, at a cost of \$10,000.

—The Grand Island Bridge Co. has been organized to build a pontoon bridge between Grand Island and the mainland on the American side of Niagara river and to make the island a summer resort.

—There is a movement afoot for the construction of a steel bridge at Columbia, Miss., to cost about \$20,000. Plans and estimates have been submitted.

—Bids are wanted till August 31 for the superstructure of a bridge over Cincinnati, Lebanon & Northern Railway at Cincinnati.

—The Wisconsin Central Railroad Co. will soon build a new bridge over Vaughn avenue in Ashland, Wis.

—The council are considering the question of a new steel bridge at River street, Woonsocket, R. I. It has also been petitioned to build a bridge over Peters river at Wood avenue. The city engineer has been directed to prepare plans for the former structure.

—The county court (Grafton, W. Va.) will construct several bridges to replace the structures recently destroyed by flood at a cost of about \$7,000.

—The railroad company has offered to build the piers and approaches to the proposed bridge at Lexington, Ky., and pay an annual rental of \$6,000 if the people of that town will complete the superstructure.

—A new county bridge will be erected from Superior mills, Scott township, to Carnegieborough, Pa., to cost in the neighborhood \$30,000. It will be of iron and steel and will cross Chartiers creek a few blocks above the town of Carnegie. It will likely be commenced in the fall.

—The county commissioners at Mogantown, W. Va., have decided to appropriate \$100,000 in bonds for the reconstruction of bridges recently destroyed by floods.

—The commissioners of the new East river bridge have decided upon the plans and specifications of the towers for the new structure. Caissons will be built and sunk to bed rock, inside of which men will work, laying two solid stone foundations, which will extend above high water 20 ft. and upon which the iron work will be built. These foundations will be 76x60 ft. The tower will extend 330 ft. above high water, and four supporting cables will be carried on its top. The tracks will be laid in the lower bridge, 122 ft. above high water. The cost of each tower will be in the neighborhood of \$480,000. It is the intention of the commissioners to select an architect for the purpose of suggesting ways in which the bridge may be beautified without taking away any of its utilitarian features.

Buildings.

—The Baltimore & Ohio Company has determined to erect a very large warehouse in Baltimore on Henderson's wharf. The building will be 250x300 feet. It will be six stories high and will have a capacity of 25,000 hogsheds of tobacco. It will cost about \$200,000 and is to be built by J. J. Walsh & Sons of Baltimore. Elevators and other facilities will be provided for transferring the hogsheds rapidly from the cars to the warehouse and from the building to vessels.

—The contract for the structural iron work of the main building of the McCool Tube Co., at Beaver Falls, Pa., has been awarded to Reeves & Son of Pittsburgh. The building is to be 400 ft. long, 40 ft. wide and two stories high. It will be of brick and iron.

—The new hospital which the Plant Railway & Steamship Co. is now having constructed at Waycross, Ga., will be one of the most complete railroad hospitals in this country. It is built of yellow pine, and is 216x148 ft. in dimensions. It contains four wards, the main building comprising 28 rooms. Verandas extend around the entire building, and all the latest ideas for convenience are being utilized in its construction.

—The contract for building five depots for the St. Louis, Avoyelles & Southwestern Railroad has been awarded to C. E. Kimber, of Alexandria, La. The depots are to be built at the following points: Bunkie, Evergreen, Cottonport, Moreauville and Simmesport. The contracts for the depots at Marksville and Mansura have not been let.

Iron and Steel.

—The company that purchased the Moore Mfg. Co.'s plant at South Milwaukee has organized under the name of the Stowell Mfg. & Foundry Co., successors to the Moore Mfg. & Foundry Co. The officers elected were: J. M. Stowell, president; Geo. P. Jones, vice president; M. H. Brand, secretary; Chas. E. Sammond, treasurer. The office of the new company has been removed to the works at South Milwaukee. It is the intention of the new company to begin active operations at once.

—The Allison Manufacturing of Philadelphia is making extensive improvements to the flue mill department of its works. Five Duff gas producers, one Herrick regenerative gas bending furnace and one Herrick regenerative gas welding furnace have been installed and these furnaces, with part of the producer plant, has been in operation for some weeks. Another larger welding furnace of the proposed series is now in process of erection.

—From Cumberland to Pittsburgh new steel rails, 85 lbs to the yard, have been distributed along the Baltimore & Ohio Railroad, and these will be laid as soon as possible. They will take the place of the present light 70 lb. rails, which are considerably worn, having been in use for a number of years.

—The capital stock of the Glasgow Iron Co., of Pottstown, Pa., is to be increased from \$200,000 to \$300,000. It is reported that the company will shortly increase the capacity of its steel mill.

—The plant under construction by the Indiana Steel Casting Co., Montpelier, will shortly be completed. The president of the company is Dr. J. W. Chisholm; Eugene H. Lahee, treasurer; Wm. Chambers, secretary and manager.

—The Indiana Iron Works and the Midland Steel Works at Muncie, Ind., largest iron and steel industry there, which has been idle for several weeks has resumed. The puddle furnace at the Indiana started double turn and the finishing mill single turn. The nut and bolt works department will not resume at this time. The companies claim that the prospects for business are not very bright and they know not how long the run will last.

—The Penn Steel Casting Co., of Chester, Pa., is said to have broken the world's record in the casting of a 16 ft., four bladed propeller wheel for Roach's shipyard. The weight of the casting is 17,000 lbs., and it is thought that the casting of this wheel will revolutionize the making of propeller wheels, which heretofore have been made of cast iron or brass. The metal used in the wheel will give it

greater strength and make it almost impossible to break off a blade.

Machinery and Tools.

—The Janesville (Wis.) Machine Co.'s plant is receiving a general overhauling and repairing. The exact date of re-starting the works is not yet settled, but in all probability the wheels will commence turning again about the middle of next month.

—The Fountain Machine Co. of Cincinnati, has been incorporated, capital \$25,000, by Emil Hilstach, Anthony Groeschel, John S. Thompson, John E. Jones and Louis E. Fricke. The company is to manufacture and sell hot air engines, gas engines and gasoline engines, and do a general business in manufacturing, dealing in, and repairing engines.

—The Playford Stoker Co. of Cleveland, states that after several months' trial of the Playford stoker, the Grasselli Chemical Co. has equipped its Cleveland steam plant with this apparatus and has contracted to equip its plants in New York, Chicago and elsewhere, having in all about 40 boilers.

—The Bass Foundry & Machine Works of Ft. Wayne, Ind., has been notified that its bid for equipping a steam plant for La Alianza, Tereon, Mex., has been accepted. The engine is to be of the usual high pressure pattern with cylinders 14x36 in.

—We are informed that the works of the Stilwell-Bierce & Smith-Vaile Company of Dayton, O. are running double turn in order to keep up with orders.

—The Morgan Engineering Company of Alliance, O., is enjoying an excellent business, the shop being well filled with orders for special heavy machinery and electric traveling cranes.

—The works of the Wrought Iron Bridge Company of Canton, O., are running full time, the company having all the orders it can comfortably handle.

—The Brown & Sharpe Manufacturing Company give notice that its annual shop vacation ended on August 15, and it is again in position to give its usual attention to special work. The office was open during the vacation, and deliveries of machine tools and of the small tools listed in catalog were continued the same then as at other seasons of the year, the custom of the company being to have these tools in stock at all times ready for immediate shipment.

—The Houston & Texas Central has just put in service one of the National electric headlights and is reported as preparing to equip all of their passenger engines with them. The Galveston, LaPorte & Houston has also ordered four complete equipments. One of these lights is being placed on engine No. 1101 of the Chicago, Rock Island & Pacific, and the Central Vermont ordered one equipment shipped to the Schenectady Locomotive Works to be attached to one of their engines which is being repaired there.

—The American Stoker Co. has recently furnished the following stoker equipments: Pennsylvania Railroad Co. shops, Columbus, O., second order; Davis & Egan Machine Tool Co., Cincinnati, O.; Toledo Brewing & Malting Co., Toledo, O.; Michigan Carbon Works, Detroit, Mich., second order; John C. Roth Packing Co., Cincinnati, O.; Cleveland City water works, Cleveland, O.

—The material and machinery for the new Texas Midland shops at Terrell, Tex., is now being delivered. An 80 horse power boiler and engine and a steam hammer with a capacity of 200, 4,000 lb. strokes per minute are on the grounds. The new sixty-four ton locomotives, Nos. 111 and 113 have also been delivered and are running regularly.

Miscellaneous.

—The Union Switch & Signal Works of the Westinghouse Co. at Swissvale, Pa., has shut down for repairs and, it is reported, will remain closed for several weeks.

—Geo. P. Allen of Boston has leased, with the privilege of purchasing, the plant of the Crystal Emery Wheel Co. at Northampton, Mass., which has been standing idle for more than a year. Mr. Allen will take possession at once, and intends to start on a small scale, extending operations as far as business will warrant. The name of the firm will be changed, though the new title is not decided upon.

—The wire fence plant of Sedgwick Bros., Richmond, Ind., has been sold to the F. B. Hart Wire & Iron Works of Detroit, Mich. The business will be continued at Richmond as a branch for the present, but it will be removed to Detroit later on.

—It is said that the Pennsylvania people are figuring on one of the largest interlocking plants in the United States for Logansport, Ind., on the Chicago division of the Panhandle. At that point the Chicago division, Peoria division and the Chicago cut-off intersect, and the Michigan division of the Vandalia, and the Toledo and Detroit divisions of the Wabash intersect with the main line to St. Louis.

—It is stated that a southern concern—the White-Crosby Co. of Baltimore—has secured the contract for the construction of electrical-power transmission circuit between Niagara Falls and Buffalo, N. Y. This line is intended to carry a current which will develop 25,000 horse power in Buffalo from the generator station at Niagara Falls, which is 25 miles distant. It is stated the contract amounts to fully \$500,000, and the line is to be completed by November 15. The current will be conveyed in twelve bare copper cables, each cable being 9-16 in. in diameter. The current will be transmitted under a pressure of 10,000 volts. Above the cables will be a lightning protector, consisting of three barbed fence wires, which will be grounded every 500 feet.